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"THE TREASURE STATE."

MONTANA

AND ITS

Magnificent Resources.

Extra Edition of the Sixth Annual Report

OF THE

From

BUREAU

OF

Agriculture, Labor and Industry

OF THE

STATE OF MONTANA,

Sept. 15, 1900

1898.

J. H. CALDERHEAD, Commissioner.
OLIVER M. HOLMES, Chief Clerk.
LOCK BOX 401.
HELENA, - - - MONTANA,

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TO THE AGRICULTURIST :

MONTANA OFFERS:

The Best Climate,

The Most Productive Soil,

The Highest Priced Home Market,

Free Range for Cattle,

Free Range for Sheep,

Free Range for Horses,

Both Summer and Winter.

The Agriculturist who Secures a

MONTANA FARM

Secures a Certain Competence.

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Offers homes for farmers on the **most productive soil,** with the **finest climate** and highest-priced home market. Farmers can till the soil of their farms and raise cattle and horses and grow wool on extensive **free winter and summer range.**

MONTANA

Offers unparalleled **inducements to capital** to engage in the development of its wonderful industrial resources.

MONTANA

Has the **richest gold, silver, copper, lead, iron and coal deposits** and mines of the Rocky Mountain range.

MONTANA

Produces the **most wealth** per capita of any State in the Union and her people are the most universally prosperous.

MONTANA

Acre for acre, has more resources than any other section of the Continent and guarantees success to the settler.

For Further Information write to

J. H. CALDERHEAD, Commissioner,

State Bureau of Agriculture, Labor and Industry,

OLIVER M. HOLMES, Chief Clerk.

Helena, Montana.

Lock Box 401.

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Introductory.

The first of the year I issued the annual report of this bureau, embracing several thousand copies, and the demand for the work has already exhausted the edition, and the continued calls for it or other information relative to the wonderful resources of the state, created by the initial issue and the newspaper comments given it, have compelled this extra edition of fifteen thousand copies, and it is hoped, though not anticipated, that this number will satisfy the demand.

In issuing this volume, the question of expense has necessitated leaving out a large amount of statistical matter that would be interesting and instructive, but I have endeavored to supply the deficiency by providing an article which embodies the principal features and facts of the tables excluded.

Montana is a state that is filled with wonderful resources—gifts of Nature that only await the application of intelligently applied labor and the investment of capital to produce the most wonderful wealth—to provide homes and incomes for the thousands—to return richly for the investments made.

With the prosperity that has rewarded our people in the past, and which they are enjoying to the full to-day, they have thought little of enlightening the residents of the east who may be seeking an opportunity to better their condition and secure homes, or who, with accumulated capital, may be looking for remunerative investment, and have sadly neglected to call attention to what Montana has to offer—to the fact that there is no spot on the continent that has the multiplicity of unequaled natural resources, the healthful and pleasant climate—the opportunities for every one who may come, in whatever calling, and certain success the reward for every intelligent effort.

The article following this will be particularly attractive to the reader and can be perused with profit, as it concisely sets forth the incomparable resources of the Treasure State, calling attention to every principal resource of each county, each of these write-ups being accompanied by an authentic map that will enable the reader who is not intimately familiar with the local geography of the state to form a more accurate idea of the extent, localities and wealth of this great commonwealth. These articles are given with the intention of presenting the more prominent claims each county of the state offers to the intending settler, and the whole that it may convey to the intending immigrant the unparalleled opportunities that may be found here—a story of wealth-producing resources that cannot be equalled by any other state in the

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Union. To this is added the information of the other departments, the whole embracing information that will answer the inquiries of the farmer, the stock-raiser, the laborer, the miner, the manufacturer, the capitalist, who may desire to investigate the resources and conditions and desirability of Montana as a place of residence and investment.

As this state, notwithstanding its multitude of resources, must, like every other, depend in a great measure on agricultural development for its permanent prosperity, considerable space has been devoted to the subject of irrigation, and the proposed artificial watering of lands by the state is fully explained, and the exceptional productiveness of our arid lands is given attention. One feature of the arid lands of the state is that they require a proportionately small amount of water, as they are very retentive of moisture, and are admitted to be so stored with plant food that they are the most highly productive of any agricultural soils. With the reclamation of these lands the state must secure thousands of agriculturalists to settle and cultivate them, and this fact has led the Bureau to present an extensive sectional description of the state and to elaborate the proposed system of public irrigation.

The industrial department will give a very comprehensive idea of the rapid development of some of the resources of the state, and the attention of the reader is particularly called to the exhaustive report on the mining industry of the state, by Mr. Eugene B. Braden. The reports on the manufacturing industries of the state also show that they have increased rapidly, both in investment, the amount paid for labor and the number of laborers employed and the aggregate output for the fiscal year.

Any information desired, that is not contained in this volume, will be furnished on application to the State Bureau of Agriculture, Labor and Industry, Lock Box 401, Helena, Montana.

J. H. CALDERHEAD,
Commissioner.

O. M. HOLMES,
Chief Clerk.

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"The Treasure State."

As Montana is a new State in point of settlement and organization, and its multitude of advantages but little known among the millions who occupy the Eastern States, and who seldom reach out for reliable information of this boundless west, the story of "The Treasure State" will be of interest.

It is said that Montana is new; but a few years since it was a territory; but a few years since it burgeoned from the wild conditions of the frontier to the more civilized occupation of mine and agricultural development, and it is true; but in those few years cities have been built, counties settled, great mines developed, the largest mineral reduction plants in the world established, a multitude of industries put in operation, successive farms established along the banks of stream and river and on the bench lands, semi-arid districts made to blossom and pour forth a wealth of product under the beneficent influences of abundant irrigation, and hillside and prairie covered with the fattest cattle and the most wooly sheep; the progress of civilization has come with leaps and bounds, and now, instead of the picturesque gulch that inspired the poet's fancy, there is nestled a busy city, and as the shadows of night are cast by the towering mountains, the scintillating shafts of arc and incandescent light illumine the attractive scene, sharply outlining magnificent structures, displaying the handsome interior of business houses whose multitudinous shelves are laden with everything that need and cultured fancy can desire, so that now, after these few years, amid the rush of the teeming streets, the whir of the electric car, the hoarse whistle of the factory, smelter and mine, and in the glare of electrical brilliancy, one is led to sweep aside the boundaries that create a fanciful west and decide that on the American continent there is no frontier, and that the memories of those picturesque days must be bound within the covers of romance and history and preserved in the artistic conceptions of the studio.

But while Montana is new, as has been said, yet its period of discovery dates back to 1742, when Sieur de la Verendrye and his sons camped at the foot of the towering mountains of the Rockies and gathered inspiration from the sun-lit blush of the snow-capped peaks and received vigor from the virgin breezes of the cleft and pass. But from that date to within the memory of the living, the great territory and all its stored and hidden treasure was in the possession of France or Spain, and little heed was paid to the gems it held. In 1803 the great Napoleon was short of money and he bargained the rich territory, together with much more, to the United States for something over twenty-seven and a quarter million dollars, parting with a magnificent birthright for

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a mere mess of pottage. The first exploration of the country made after it became a possession of the United States, was by a party under Capt. Merriwether Lewis and Lieut. William Clark, sent out in 1804 by President Jefferson. In 1805 this party traversed what is now the State of Montana, east and west, and the next year returned over the same route, making a cursory examination and giving to the public the first information of definite character regarding what was destined to be the richest of the sisterhood of states.

Following this superficial knowledge of the country, Emanuel Liza, in 1809, established a trading post on the Yellowstone; then in 1835 the steamboat Assinneboine came up the Missouri to Fort Buford and ascended the Yellowstone some sixty miles. In 1827 The American Fur company established a post on the Missouri at the mouth of Milk river, and in 1846 Alexander Culbertson built Fort Benton, and on the 2nd of July, 1860, the steamboat Chippewa reached that point and established it as the head of navigation of the Missouri. During this period, civilizing influences had been reaching out in other directions, Father De Smet having built St. Mary's mission, at what is now Stevensville, Ravalli county. To Father De Smet must be given the credit of having planted the first wheat field, of sowing the seed of agricultural industry that has so wonderfully multiplied and filled the land with plenty. In 1845 the same energetic frontiersman built the St. Ignatius mission, founding a school for both girls and boys. So, with this short rehearsal, we have the history of the laying of the corner-stone of the institutions of religion, education, agriculture and commerce, and with this period is treasured in the archives of frontier memory the unwritten history of many a hero.

From this period until very recent years, the State made but slow progress along the paths of civilization and development. For years the great prairies and mountain fastnesses were the haunts of roving bands of Indians, with an occasional hunter and trapper making surreptitious incursions into the country, tempted to brave the dangers by the abundant game that occupied the territory from the Missouri to the mountains.

The great area of the State of Montana can be appreciated when its land surface of 92,998,400 acres, or over 145,300 square miles, is contrasted with the area of some of the eastern states, or with the combined area of several of them, and to this for a total area must be added a water surface of 770 square miles. Locating the state exactly, it is placed between the 104th and 116th meridians west, and between the 45th and 49th parallels north. Its width north and south is 275 miles, and its average length east and west is over 535 miles, these distances proving it the third largest state in the union. Less than one-third of the state is mountainous, and the other two-thirds of its great area is about equally divided between grazing and agricultural lands, some of the latter being susceptible to cultivation without irrigation, and the balance requiring artificial watering. The area of arable lands is greater than that of New York, Pennsylvania, Massachusetts, Connecticut, Rhode Island, New Hampshire, New Jersey, Delaware or Maryland, all combined. Montana is larger than New York

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and the six New England states combined; larger than Iowa and Minnesota combined, and larger than England, Scotland, Ireland and Wales all put together. The state is bounded on the east by the Dakotas, on the south by Wyoming and the Yellowstone National Park; on the west by Idaho and on the north by the provinces of Alberta and Assinaboia, Canada. The territory of Montana was established by act of Congress May 26, 1864, embracing its present area, being taken from the territory of Idaho. November 8, 1889, Montana assumed the dignity and responsibility of statehood, and the record of this volume gives ample evidence of how well she has preserved her trust and improved her endowment of talents.

The topography of the state is of especial interest. Prof. Gannett, of Hayden's survey, gives the average altitude above sea level as 3,900 feet, that of Colorado 7,000 feet, of Nevada 5,600, Wyoming 6,400. This report gives but 9,000 square miles of Colorado as being below 4,000 feet, and none of Utah is that low, while Montana has 51,600 square miles that lie below 4,000 feet, and has 40,700 square miles that are less than 3,000 feet above sea level. The United States Bulletin says that "taking the area of Montana as a whole, it has been ascertained that 40 per cent is under 5,000 feet below sea level, 21 per cent from 5,000 to 6,000 feet, 14 per cent from 6,000 to 7,000 feet, 9 per cent from 7,000 to 8,000, and 7 per cent over 8,000."

This technical description may be supplemented by saying that the portion of the State embraced in the counties of Valley, Dawson, Custer, Yellowstone, Fergus, Choteau and the greater part of Cascade and Teton, is a gentle, undulating prairie, except in those parts of the counties lying near the foothills of the mountains, where the surface is more hilly, being cut by the numerous coulees that find their rise in the mountain gulches and the "draws" from the deep river and creek beds. A portion of Teton county is mountainous, and the southern part of Cascade county lies in the Belt range, but as these are rich in deposits of silver, copper, gold and other metals, their presence is not objected to. The other counties of the state are mountainous, though there are in all of them broad valleys and basins that afford thousands of square miles of the most fertile soil, and opportunities for the agriculturist and stockraiser that are not equalled in any other state in the union. While the counties first mentioned have but little timber, these mountainous counties possess an abundance and great variety of timber, an item that fully compensates for the more restricted agricultural acreage. The main range of the Rocky Mountains runs northwest and southeast through the state, and from their snow-capped peaks and riven sides flow the thousands of streams that make it the best watered state of the western country. The general elevation of this range at the crest is not over 6,500 feet, but her lofty peaks reach heavenward from 9,000 to 11,500 feet, an altitude at which the snows of all centuries have accumulated, and the daring climber may look down upon the clouds and the storm. Beside the main range, there are the Belt and Highwood ranges, the Coeur d'Alene, Bitter Root, Tobacco, Bear Paw, Crazy, Little Rockies and the Big Snowy mountains, all spurs of the main range with the exception of a couple of small isolated groups. The two largest and most important rivers of the state are the

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Missouri and the Yellowstone, the former finding its source in the united waters of mountain streams in Madison, the most southerly county in the state, and thence taking an erratic course north to the center of Choteau county, within thirty miles of the Canadian border, when it turns and runs almost directly east to the eastern boundary of the state, while the Yellowstone river has its source in the lake of its name in the National Park, and meanders through the state in a northeasterly direction to its confluence with the Missouri at Fort Buford, just across the eastern border of the state in North Dakota, and fifty miles south of the Canadian line. These rivers are navigable for hundreds of miles, and during the earlier period of the state's development, before the advent of the transcontinental lines that now afford the most ample means of transportation, they took a prominent part in the commerce and business of the state. The Columbia river and its thousands of tributaries traverse the western part of the state, and a loop of the Kootenai, hundreds of miles in length, runs through the northwestern part of the state. Added to these are dozens of rivers of more or less importance and thousands of smaller streams, all contributing a proportionate share to the agricultural abilities of the state. While Montana is not a state of lakes, still it has some of the most beautiful inland gems, the most prominent of which is Flathead lake, in the northwestern quarter of the state. This lake is 27 miles in length and has an average width of twelve miles. It is surrounded by mountainous timber lands and rich mineral districts, is navigable together with its river outlet of the same name, and plays a prominent part in the commerce of that section. Montana is artistic and grand in its scenic attractions, incomparably rich in the mineral deposits of the mountains that give its grandeur of beauty, and the rich soil of every hill, valley and dale is abundantly prolific.

And to all these lavish gifts from the liberal hand of Nature, the most healthful and exhilarating climate and the abundance of purest water must be added, and with these, numbers of thermal springs that are impregnated with many healing properties. There are no fogs, no malaria in Montana, and contagious and infectious diseases are rare, and when manifested, prove to have come from the infection of less favored states, but here yield readily to professional treatment. The winter season is not one of continued cold; the frigid breezes of Canada when directed over the state will send the thermometer down as low as 20 degrees below zero, but these cold periods are not frequent and are of short duration, as the prevailing winds of winter are the soft chinook that dissipates the snow and brings the balmy atmosphere and tinge of autumn. And the degree of cold mentioned is not felt as severely in the dry atmosphere of Montana as is 20 degrees higher on the Atlantic coast. Except upon the plains of the extreme eastern border of the state, the blizzard is unknown, and the cyclone and tornado are not experienced. Great herds of cattle and flocks of sheep feed throughout the winter on every bench and prairie and are given neither shelter nor attention. The nourishing properties that remain in the grass and sustain the stock during the winter months is due to the fact that before the grass is ripened, the chinook winds cure it, turning it into

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standing hay instead of having the frosts drive the nutriment into the roots, leaving dead and substanceless grass. This, together with the salubrity of the climate, is the secret of the success of Montana's stock ranges. Except in the midst of the mountain ranges, and at a considerable altitude, the snowfall is light, seldom covering the surface at a single precipitation to a depth of more than a few inches. The winters of Montana are capricious, but they are sunlit, warm and pleasant, and the occasional cold snap but adds vigor to prevailing energies. The spring, the summer and the fall are all enjoyable seasons, and though in midsummer, when the sun is overhead, the temperature rises to an uncomfortable point, as the sun dips below the mountains, the cool air of the Rockies displaces the heated atmosphere of the day, leaving the evening and night refreshing and delightfully restful. Montana does not aspire to be a health resort; its people are too healthy and busy to engage the thought; but her people are contented to live and die here, and when they go to other states that claim especial climatic advantages, they invariably return more than satisfied to remain. This is the land of sunshine, where the sun shines three hundred days in every year, and the other days are but dimly clouded. In summer and winter the atmosphere is dry and clear and unequaled for its vigorous healthfulness; consumption never develops, and when brought in its incipiency can be invariably cured.

Though there are large areas in the state that are classed as arid, yet there are thousands of square miles that receive an abundant precipitation of moisture, these lands lying particularly in Cascade, Gallatin, Missoula, Flathead and Ravalli, but in all the counties bordering the mountains, the low lands of the foothills receive sufficient rain. The other agricultural lands of the state, with the exception of low river bottom lands, whose subsoil is moistened continually with the water of the river, require irrigation; but when placed under water produce with wonderful and unfailing abundance. As an inducement to the reclamation and settlement of these lands, congress in 1894 passed the Carey desert land act, giving the state title to one million acres of arid lands, title to be passed when the state should reclaim the lands. In 1895 the state legislature formally accepted the offer of the general government, and the following session of the legislature passed an arid land act creating an irrigation commission and providing means for securing funds for the reclamation of the entire acreage offered. This commission has made commendable progress, and attention is called to their report, which may be found in the following pages of this volume, and its perusal will be more than interesting, and to intending settlers will be found to contain much valuable information. Until within the past three or four years, irrigation has been confined to diverting water from the rivers and lesser streams over the contiguous bottom lands, but now there are a number of irrigating canals that water considerable districts of the higher lands, notable among which are the Minnesota & Montana Land Improvement Company's canal, in the vicinity of Billings; the Crown Butte, with water taken out of Sun river west of Great Falls; the Dearborn canal, in Lewis and Clarke county, one of the first canals of any importance

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in the state; the Cascade Land Company's canal, north of Great Falls; the Miles City canal, in the neighborhood of the city of that name; the Manhattan canal, in the Gallatin valley; the West Gallatin canal, also in Gallatin county; the Bitter Root canal, in Ravalli county, and the Conrad Brothers' canal, in Teton county, a new project upon which work is being pushed. When this canal is completed, it will place 50,000 acres under water. The aggregate land irrigated by these canals is estimated at over 200,000 acres. In past years there has been very little land fenced, but of late years the farmers have been inclosing their holdings. The foothills and high ranges, however, are yet and always will remain open and free for the stock of every farmer and rancher to range upon. The products of the farm are the same as those of the middle states, but the yield, especially in the cereals, is much more abundant. Grasses grow luxuriantly and the yield of hay from irrigated lands is enormous. The more common crops are wheat, oats, barley, rye and buckwheat. Flax is a sure and abundant crop, but there is little home demand for it, and as the market is so distant, little attention has been given to its culture. This will not become an important product of the farm until a linseed mill is established to consume the product. There is an exceptional opening for the profitable investment of capital in a Montana linseed oil mill. Vegetable and root crops are abundant, and in the southern valleys on both sides of the main range the larger and smaller fruits are grown in the greatest abundance. In Missoula, Flathead and Ravalli counties, fruit growing is nearing the front rank of importance, the apples, plums, peaches, cherries, strawberries, etc., of these districts being noted for their excellence of flavor and preservative qualities.

A special advantage to all the agricultural interests of Montana is that the home demand for farm products of every nature far exceeds the supply, insuring a cash market and high prices. As the greater part of the population of the state will be for all time occupied in mining and attendant industries, the condition of the market for agricultural products, as noted, will always remain.

There are several ways in which the intending settler may obtain lands:

By locating on public lands in the districts mentioned where irrigation is not necessary.

By locating on public lands that require irrigation, but so located that a water appropriation may be made and the water diverted without incurring too great an investment.

By locating and acquiring title to lands that will be irrigated under the state arid land commission act.

By leasing or purchasing lands that are embraced in private canal systems.

By purchasing improved lands carrying water rights.

A brief synopsis of the laws governing the location of lands may be of interest to the investigator of Montana's agricultural advantages, and is as follows:

A homestead may be secured by any person who is the head of a family, or who has arrived at the age of twenty-one years, and is a citizen of the United States, or has filed his declaration of intention to become such, and

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who is not the proprietor of more than 160 acres of land in any state or territory, is entitled to one-quarter section (160 acres), or less quantity of unappropriated public land, under the homestead laws. The applicant must make affidavit that he is entitled to the privileges of the homestead act, and that the entry is made for his exclusive use and benefit, and for actual settlement and cultivation, and must pay the legal fee and that part of the commisions required, as follows: Fee for 160 acres, $10; commission, $4 to $12; fee for 80 acres, $5; commission, $2 to $6. Within six months from date of entry the settler must take up his residence upon the land, and reside thereupon and cultivate the same for five years continuously. At the expiration of this period, or within two years thereafter, proof of residence and cultivation must be established by four witnesses. The proof of settlement with the certificate of the Register of the Land Office is forwarded to the General Land Office at Washington, from which patent is issued. Final proof cannot be made until the expiration of five years from date of settlement, and must be made within seven years. The government recognizes no sale of a homestead claim. After the expiration of 14 months from date of entry the law allows the homesteader to secure title to the tract, if so desired, by paying for it in cash and making proof of settlement, residence and cultivation for that period. The law allows only one homestead privilege to any one person, but under act of March 2, 1889, section 2 provides in certain cases, when the first homestead was necessarily abandoned, that a second homestead may be made.

An unmarried woman, of age, can take the benefit of the homestead law. If she marries before she has acquired the title, and continues her residence on her claim, she can proceed to prove up at the proper time, the same as if she had remained single, but husband and wife cannot secure separate tracts by maintaining separate residence at the same time. All the sons and daughters of a family, who are of age, are entitled to take up land under the United States land laws.

A soldier who has served in the army or navy during the War of the Rebellion for over 90 days, can obtain 160 acres of any of the public lands by filing (himself or by an attorney) a declaratory statement, and within six months thereafter filing his affidavit and application, commencing settlement and cultivation, and continuing the same for five years, less the time he served in the army or navy, but such time in no case to exceed four years. His widow can take advantage of the above. In case of his death in the army, or discharge therefrom on account of wounds or disability incurred in the line of duty, the term of his enlistment is deducted. In case of the death of the soldier, his widow, if unmarried, or in case of her death or marriage, then his minor orphan children, by a guardian duly appointed and officially credited at the Department of the Interior, shall be entitled to all the benefits given to soldiers under the homestead laws.

Under the desert land act, any citizen of the United States, or persons who have declared their intention to become such, and who are also residents of the state or territory in which the land sought is situated, may file a declaration,

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under oath, with the Register and Receiver of the land district in which any desert land is situated, that he intends to reclaim a tract of desert land, not exceeding 320 acres, by conducting water upon the same, within four years. At the time of filing this declaration a fee of 25 cents for each acre of land proposed to be so reclaimed must be paid.

At the time of making the declaration the land taken up under this act must be particularly described, if surveyed, or, if unsurveyed, must be described as nearly as possible. The party shall also file a map of said land, which shall exhibit a plan showing the mode of contemplated irrigation, and which plan shall be sufficient to thoroughly irrigate and reclaim said land and prepare it to raise ordinary agricultural crops, and shall also show the source of the water to be used for irrigation and reclamation. At any time within four years, upon making satisfactory proof to the Register and Receiver of the reclamation of said land, and the expenditure thereon for improvements of $1 an acre each year for three years, and proof of the cultivation of one-eighth of the land, and upon the payment of the additional sum of $1 per acre, a patent shall be issued. A claimant must also file with the Register during each of said three years proof by the affidavits of two or more credible witnesses that he has made such expenditures. He may, however, prove up earlier whenever he can make the required proof of reclamation, cultivation and expenditure to the aggregate extent of $3 per acre. All lands, exclusive of timber and mineral lands, which will not, without irrigation, produce some agricultural crop, are deemed desert lands. Residence on the land is not required.

Under the timber and stone act, any citizen of the United States, or one who has declared his intention to become such, can acquire not to exceed 160 acres; land must be chiefly valuable for timber or stone, containing no valuable deposits of gold, silver, copper, coal or cinnabar. Applicant is required to file sworn statement with Register and Receiver that he has made no prior application; to designate the tract required by legal subdivisions, setting forth its character as above, and that it is for applicant's own use and benefit. Such application will be published sixty (60) days when the applicant files further proof of the character of the land, paying $2.50 per acre therefor. Married women can purchase in Montana.

There are United States land offices at Miles City, Custer county; at Lewistown, Fergus county; at Bozeman, Gallatin county; at Helena, Lewis and Clarke county, at Missoula, Missoula county, and at Kalispel, Flathead county. The homestead affidavits can be made before the clerk of the District Court at any county seat, or before any United States Commissioner in the state, and the journey to the land office be saved.

The fuel supply of Montana is abundant. Within her borders there are over twelve million acres of timber land, not counting the disconnected bodies and those that fringe the rivers and streams. The forests that contain the timber that is of commercial value are in the mountainous mineral districts, Nature having appreciated the necessity in all mining operations of an abundance of

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heavy timber, this industry using immense quantities of timber every year. The coal measures of the state are the most extensive in the west, beds of an excellent quality of bituminous coal having been developed in nineteen of the twenty-four counties of the state; in several of the counties, notably Cascade, Carbon, Park and Gallatin, some very extensive mines have been developed, their present daily output aggregating many thousands of tons. As an indication of the magnitude of the coal beds, it is estimated that in the fields of Sand Coulee and Belt, in Cascade county, there are six million tons to the square mile, and as the coal area of the state embraces thousands upon thousands of square miles, it is apparent that Nature provided the state with fuel for all ages to come.

Attention was first attracted to the minerals of Montana through the discovery of gold made in what is now Deer Lodge county, by a Red River half-breed named Finlay, in 1852. The creek upon which the precious metal was discovered was named Gold creek, and bears that name now. Six years later other gold discoveries were made in the same neighborhood by the Granville Stuart party. In 1862 the Stuart-Anderson party developed placer claims near the present location of the town of Pioneer. The rich returns of their mines was really the incentive to further prospecting, discovery and the development of the mines of Montana. Following the opening of the Pioneer placer claims, came the discovery of rich ground at Bannack, Alder, Ophir, Last Chance, now the location of the city of Helena, Confederate, Pilgrim Bar, Silver Bow, Bear, Elk, Cave, Lincoln, Cedar creek, and several hundred other places, all of which produced lavishly of the coveted metal, and in the course of a few years added hundreds of millions of dollars to the gold supply of the world.

During this period of placer mining, discoveries of the other metals that are abundant in the mineral districts were made, but there was little development of the deposits until the advent of transportation facilities. Allen & Arnold are credited with reducing the first gold quartz in Montana, in a mill erected at Bannack, Beaverhead county, in 1862-3. It was "home-made," the lumber and iron being obtained from dismantled wagons that had been brought "across the plains." It had six stamps, of 400 pounds each, and was successfully run by water on free ores from the Monitor lode. The first clean-up was made in October, 1864. The first steam quartz mill, 12 stamps, was built and operated at Summit, at the head of Alder gulch, Madison county, by the Idaho Mining Company, commencing operations December 28, 1865.

The first quartz mill was established at the present location of the town of Phillipsburg, in 1867, and the first successful silver smelter was erected at Argenta during the same year. There were too many obstacles to overcome, however, and the silver industry did not become of any importance until 1876, when the recorded output was $1,132,976, and the annual production did not reach the two-million figure until 1879, but after that year there was a steady and rapid increase until the output in 1892 was $22,432,323. Then the slump of July of the succeeding year came, closing a majority of the mines and proportionately reducing the product.

The first discovery of copper was made in 1864, by two prospectors who were in search of gold in the vicinity of the present "Greatest Copper Camp on

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Earth"—Butte. The first practical development of a copper prospect was made in 1866, in the same locality, a shaft being sunk on what is now the Parrot mine, and during the fall of the same year, a furnace was established. The wealth of the copper deposits at Butte was first recognized officially by United States Commissioner of Mining and Statistics Raymond, in his report of 1870. From this date to the present time the development of the copper deposits has been rapid, and at this writing the state contains not only the richest copper mines of the world, but also the largest and most modern reduction plants, employing thousands of men and turning out millions of dollars' worth of refined copper annually.

In tracing the mineral development of the state, the product and values of the years covered have not been quoted, but these may be seen in the tabulated statements that appear in another department of this volume, and to which attention is especially called.

Montana presents an inviting field for everybody of whatever calling, who has the energy and the earnestness to successfully take advantage of the multiplicity of resources to which attention has been briefly called.

Montana was romantic in its past history; it is industrially great in its present, and yet her manifold resources have scarcely been touched.

This is the story of the "Treasure State."

There is, perhaps, no section of the world that offers such tempting opportunities to the tiller of the soil as does Montana. It offers many special inducements and advantages that are denied, by reason of natural causes, to the farmers of every other section of this continent. Its special advantages may be concisely stated as being a high-priced and permanent home market, direct shipping facilities with the western and foreign Asiatic market, the finest and most healthful climate, the most luxuriantly productive soil and unlimited free winter and summer range for the cattle, horses and sheep of every farmer—a combination of advantages that are not offered elsewhere to those who may be seeking to establish their homes under more favorable circumstances than they now enjoy.

The fact that the state has now and always will have a great preponderance of its population engaged in mining and smelting, other industrial and business occupations, assures the farmers who are so fortunate as to secure an advantageously located farm in this state, a permanent, abundant and high-priced market for every product of the farm. The per capita consumption of Montana is greater than that of any other state, and in the past, and as it will be in the future until our farm lands are settled and made to produce very much the larger part of the products of the soil that are consumed will have to be imported. But with the settlement of the arable lands of the state, this will be changed, and hundreds of thousands of dollars that are now annually sent outside of the state for the products of the farm will remain here, where they are made and earned, and will be paid to home farmers for the productions of Montana soil. But a very inconsiderable portion of the population of Montana is now engaged in agricultural pursuits, and the proportion will not be abated, as with the continued rapid development of the wonderful mineral resources of the state,

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thousands and hundreds of thousands of hands will be employed in the mines, the smelters and their collateral industries; but there are thousands of opportunities for agricultural locations that not only offer a home for those who are now without homes, but that offer an opportunity for the homesteader to prosper and grow rich—to experience a measure of prosperity that has never in any other land been the good fortune of the farmer. Aside from the home market that will provide the best market for the product of thousands of Montana farms, it is in close communication with the western market and at the very door of the Asiatic market that is now opening up such extensive possibilities for the products of the American farm and range.

The climate of the state is the most enjoyable and healthful to be found on the continent, and while it lies in a comparatively northern latitude, is favored with the temperature of the more northerly southern states. Its summers are delightfully bright and warm by day, and the evenings and nights are refreshingly cool and restful, while in the winter season the soft chinook winds dissipate the cold and intersperse the crisper days with the inspiring cheer and warmth of full spring time. It is very rare that a period of cold continues longer than from two to four days, or that the snow is allowed to accumulate to any considerable depth, so that cattle, horses and sheep are allowed to range uncared for during the winter months, pasturing upon the rich grasses of the hills and valleys, caring for themselves without cost or worry to the owner. To the farmer of Montana is given the opportunity, without the use of any portion of his own landed possessions, to engage in the raising of cattle and horses, and the growing of wool, branches of the agricultural industry that have brought wealth to many of Montana's present residents and that have not one record of even partial failure to be made against them.

But so as to give the reader the most detailed information as to the climate, the following report of Section Director Glass, of the U. S. Weather Bureau, which he gives as a review of the crop season for 1898, is reproduced.

The temperature during the months of January and February was greatly in excess of the normal, while the precipitation showed a slight deficiency; March was colder than usual, and never before, since the establishment of weather bureau stations in Montana in 1880, has the minimum temperature been so low so late in the month. Usually the minimum for March occurs before the 15th, but this year at Helena there was recorded —10° on the 21st, —16° on the 22d, —6° on the 25th, and —7° on the 26th; the lowest for the entire state was —37°, on the 22d, at Adel, in Cascade county. March precipitation was above the normal, breaking the record at Helena and several other stations in the central portion of the state; at the end of March there was an unusual amount of snow in the mountains.

The temperature for April gave an excess in the western part of the state, while it showed a decided deficiency in the eastern portion; the precipitation was about normal.

Although quite a little plowing was done in January and February, farm work did not begin until about April 25, which is about a week or ten days later than the usual time for commencing plowing and seeding. Grass began growing late in April, on account of the cold weather during the latter part of March and the beginning of April.

The warm weather of May caused the snow to melt rapidly on the mountains, thereby causing streams to overflow their banks, inundating thousands of acres of bottom lands used for grain fields and meadow lands. During the first half of May nearly all the plowing was accomplished, and by the end of the month seeding was practically over. May 15th found fruit trees in blossom and gardens were being planted; grain in the Flathead valley was from two to five inches in height. The

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rainy season began May 12th, and by the end of the month the ground was in excellent condition for growing crops, and grass on the ranges was reported as growing rapidly. In Choteau county, in the vicinity of Shelby, grass was reported as 10 inches in height.

The warm weather of June, with its frequent showers and abundant sunshine, caused the crops to advance rapidly. Some alfalfa was cut in Park, Sweet Grass and western Yellowstone counties as early as the second week in June. The strawberry crop was quite large in western Montana, and the first that were marketed came from Flathead county during the second week of June, and the gathering of the strawberry crop was at its height July 1.

After July 2 the precipitation was light, consisting of local showers, and irrigating crops was soon commenced. Hay harvesting began in western Montana during the second week in July, and became general throughout the state July 19; some fall wheat was cut in Missoula county during the third week in July.

The weather of August rapidly matured the crops of all kinds; the hot, dry winds visibly affected grain that was not irrigated, and range grass cured very fast. The harvesting of fall wheat began in the Gallatin valley the first week of August; also all berry crops excepting blackberries were harvested. The second week of August found all the timothy hay cut and the second crop of alfalfa ready for cutting, and grain harvesting becoming general throughout the state. The fruit crop, principally apples, was very good, and in some instances the trees were so loaded with fruit that quite a quantity had to be picked off to protect the trees.

September was characterized by a rainy period from the 1st to the 5th, which delayed the harvest of spring grain and the cutting of the third crop of alfalfa. Frosts did considerable damage to late vegetables.

October temperature was about 5° below the normal and was the coldest on record since 1883; the precipitation was considerably above the average for the month.

The usual cold wave for November occurred on Nov. 19, being accompanied with heavy snow and high winds.

On account of the scarcity of harvest employes, the grain was stacked in many localities and threshing machines were running when the weather was favorable during October and November.

Cattle, horses and sheep did well during the year. The increase in calves and lambs has been slightly below the average. During the summer it is reported that horse-flies were so numerous in some localities as to cause cattle and horses to lose flesh. These bloodthirsty insects were so vicious in their attacks as to cause large droves of cattle and horses to leave the hills where grass was plentiful for the prairie country where grass was short and water scarce.

During the growing season it has developed that the Russian thistle has been spreading, and this noxious weed has now been found in considerable quantities in western Montana in the vicinity of Plains. The spread of this weed is due to the failure on the part of the farmers or ranchment to recognize the Russian thistle when it is seen.

On account of the ground not having enough moisture in it to plow, the acreage of fall sown grain will be somewhat less than usual. Some farmers, however, did not wait for rain to come, and as soon as their crops were taken care of, commenced getting their ground in shape for next year's crop. Fall-sown grain gets the full advantage of the wet season, which comes in May and June of each year, and by the time the hot weather comes in July it has grown sufficiently high to shade the ground, thereby causing much moisture to remain in the ground for the benefit of the growing crop.

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Maximum and Minimum Temperature for 1898.

Monthly Maximum Temperatures and Dates for Montana, 1898.

STATIONS	January		February		March		April		May		June		July		August		September		October		November	
	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.
Adel	....	....	....	.....	51	6	75	25	71	10	81	27	85	10	90	26	80	27	60	10, 13 22	50	3, 14
Augusta	55	1	60	27	65	1	89	25	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	..	.....
Big Timber	54	4	57	28	60	7	82	22	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
Billings	48	20	59	13	68	7	89	21	78	9, 10,16,22	93	9, 19, 27	95	27	96	12, 21	87	27	....	.....	....	.....
Boulder	....	.....	57	14	53	7	78	25	71	11	89	19	90	11, 25	91	3, 12	....	.....	....	.....	50	3
Bozeman (1)	44	6	52	15	54	7	78	20	77	10	90	19	90	5	92	12	88	19	....	.....	....	.....
Bozeman Ex. Station	43	6	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
Butte	41	3	49	26	53	6	74	25	....	.....	87	18	90	11	90	8, 11	86	19	....	.....	....	.....
Castle	39	3, 6, 7, 29	46	28	48	1, 3, 7	72	25	71	9	87	18	85	10, 15, 25	87	27	83	19	60	8	46	6
Chinook	42	29	56	7	50	5	76	25	78	23	95	19	90	16	97	20	87	19	....	.....	..	.....
Choteau	....	.....	....	.....	68	6	82	26	78	11	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
Columbia Falls	42	31	47	15	52	1	74	25	77	26	87	18	95	9, 11	92	8, 10	....	.....	....	.....	....	.....
Corvallis	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
Crow Agency	..	.....	....	.....	...	.....	85	26	82	10, 22	96	19	97	25	96	20	89	19	75	22	68	6
Darby	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	94	18, 19, 21, 25	72	2	....	.....
Dearborn Canyon	51	2	52	7, 25	52	6	79	25	75	11	88	18	92	15	92	10, 14, 26	87	19	64	21	59	1
Deer Lodge	43	6	61	27	50	6	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
Dupuyer	50	3	58	6, 7, 28	52	2	82	25	76	26	88	18	95	11, 15	94	7, 11	85	26	64	21, 30	....	.....
Ekalaka	....	.....	....	.....	....	.....	82	26	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	56	3
Florence	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	89	17	63	8	53	1
Ft. Benton	58	5	62	6	58	6	86	25	77	26	92	18	92	4	98	26	91	19	....	.....	50	2, 8
Ft. Keogh	45	7	52	7	60	6, 7	85	25	90	23	102	19	104	26	102	21	94	27	68	23	60	4
Ft. Logan	55	31	57	15	68	2	75	25	73	26	89	18	87	9	94	21	85	19	60	13, 22, 30	51	2
Glasgow	40	8	54	5	53	6	77	26	83	22, 23	97	19	101	12	98	19	85	27	61	13	58	2
Glendive	43	3	56	12	65	7	75	26	....	.....	103	19	103	25	105	21	96	27	73	14	57	14, 16
Glenwood	51	6	51	15	54	7	81	25	76	10	92	19	92	10	92	26	86	19	64	7, 8	58	2
Great Falls	64	31	63	5	60	6	79	25	76	10	89	19	97	11	91	12	83	19	62	13, 14, 30	53	6
Havre	40	2	58	7	53	6	83	25	76	10	94	19	98	16	97	20	90	19	69	14	59	6
Helena	41	5	55	15	58	6	80	25	77	10	88	18	90	4	93	12	87	19	65	21	51	6
Kalispell	40	31	51	7, 15	55	28, 29	80	25	80	25, 26	92	18	95	11	96	20	85	12, 17	61	8, 21	55	6
Kipp	47	1	53	28	51	6	76	25	84	24	88	9	93	11	92	7, 9	90	17, 20	65	30	47	1, 14, 18
Lewistown	49	1, 2	55	21, 27	53	7	81	25	76	10	90	19	....	.....	....	.....	....	.....	....	.....	....	.....
Livingston	45	3, 4, 7	56	16, 28	59	1	81	26	83	11	94	18	90	15	94	13	87	19	68	9, 23	58	2
Manhattan	44	6	54	13, 15	59	7	79	25	82	10	89	27	90	11, 16	93	12	88	19	66	14	54	1
Martinsdale	45	2, 3, 4	55	7, 21, 28	55	7	76	25	76	11	88	18	94	11	92	19	84	12, 19	64	8, 14	50	4
Marysville	42	2	50	5, 28	52	6	77	25	72	10	83	18, 27	86	10	89	10, 12	82	18	58	21	46	29
Miles City	44	8	54	12	66	7	88	26	87	23	102	19	103	25	102	20	91	27	72	14	60	3
Missoula	41	20	57	8	60	7	82	26	78	25	..	.....	..	.....	93	25	90	18	66	8	50	5
Parrot	49	3	55	14	49	2	80	25	80	10	93	19	93	25	95	10	84	18, 19, 26	....	.....	..	.....
Plains	....	.....	....	.....	..	.....	....	.....	..	.....	..	.....	....	.....	....	.....	82	17	....	.....	48	4
Poplar	40	3,5, 7, 8, 27, 29	52	7, 12	57	6	80	26	87	22, 23	99	19	103	11	100	18, 19	94	27	68	14	50	3, 14

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Maximum and Minimum Temperature for 1898—Continued.

Monthly Maximum Temperatures and Dates for Montana, 1898.

STATIONS	January		February.		March		April		May		June		July		August		September		October		November	
	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.	Max.	Date.
Radersburg	49	6	58	16	56	7	77	15	76	31	104	19	100	26, 30	....	....	85	20	65	27	..	....
Red Lodge	....	....	52	16	48	1, 8	75	27	73	10	88	20	....	....	....	....	....	....	....	....	60	1, 2
St. Ignatius	43	5, 15, 19	55	8, 15	58	3, 7	79	26	77	11, 26, 27	80	8, 19	....	....	88	26	81	18	66	4	52	1
St. Paul	48	4	55	23	60	7	74	26	74	22	90	19	93	11	93	9, 20, 21, 27	86	20	73	11	60	3, 7, 14
Shelby	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	..	....	65	12
Troy	42	31	54	15	56	31	83	25	86	25	91	18	100	12	100	7, 8	89	11	....	....	....	....
Utica	45	2, 3	54	6, 28	54	1	84	26	78	27	90	20	93	12	95	19	90	20	67	9	51	1, 6, 27
Virginia City	41	6	50	15	52	7	76	25	....	....	..	....	....	....	....	....	....	....	....	....	....	....
Wibaux	44	2, 13	54	7	64	7	86	26	84	23, 24	94	20	98	10	95	19	....	....	....	....	56	2, 4, 8
Yale	71	18	55	7	59	8	80	26	75	11	87	19	92	4, 26	95	22	87	28, 29	60	15	....	....

Monthly Minimum Temperatures and Dates.

STATIONS	January		February		March		April		May		June		July		August		September		October		November	
	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.	Min.	Date.
Adel	....	....	....	....	—37	22	—9	1	21	4	28	1	32	31	31	23	21	6, 10	4	20	—21	21
Augusta	—22	9	—8	1	—34	25	7	3	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Big Timber	—10	9	3	1	—23	22	12	4	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Billings	—1	23	—5	16	—20	21	6	1	27	2	41	8	43	30	46	23	28	10	....	....	....	....
Boulder	....	....	—3	2	—20	22	15	4	10	3	32	2	35	1, 2	41	1	....	....	....	....	—15	21
Bozeman (1)	—7	25	2	2	—16	22	16	4	29	2	33	3	37	2	44	18	29	28, 29	....	....	....	....
Bozeman Ex. Station	—6	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Butte	—9	24, 26	9	1, 9, 18	—19	22	16	1	..	....	35	6, 26	33	1	43	23	28	28, 29	....	....	....	....
Castle	—12	24	2	2	—23	22	13	4	22	5	—30	2	31	2	35	2, 26	20	10	9	3, 4	—14	21
Chinook	—8	25	—15	2	—18	26	—5	1	28	2, 3	34	29	38	1	43	31	29	28	....	....	....	....
Choteau	—10	10	—11	19	—21	26	1	1	24	4	....	....	....	....	....	....	....	....	..	....	....	....
Columbia Falls	—1	28	8	19	—14	22	20	3	28	3	32	21	36	6, 7	38	5	....	....	....	....	....	....
Corvallis	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Crow Agency	....	....	..	....	....	....	15	1	26	4	38	1	42	18	47	2, 23, 24	30	10, 30	21	17	—17	21
Darby	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	22	30	11	26	6	20
Dearborn Canyon	—2	9	—15	19	—28	26	Z 0	1	20	3	36	21	35	1	40	1,23,30,31	33	24	7	4	—20	21
Deer Lodge	—7	25, 26, 27	4	2	—15	22	19	1	24	3, 5	....	....	....	....	....	....	....	....	....	....	....	....

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Maximum and Minimum Temperatures for 1898—Continued.

Monthly Minimum Temperatures and Dates.

STATIONS.	January		February		March		April		May		June		July		August		September		October		November	
	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...	Min ...	Date...
Dupuyer	—2	10, 23	—25	19	—20	29	10	1	24	1, 3	30	1	38	21	38	22	28	28	8	2	....	.....
Ekalaka	....	.....	....	.....	....	.....	28	20	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	—15	21
Florence	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	32	6	19	4	—3	21
Ft. Benton	—5	24	—10	18	—18	25	6	1	29	2, 3	37	2	43	2	45	5, 29	35	10	....	.....	—8	21
Ft. Keogh	—15	24	14	2	—14	22	10	1	30	4	45	1	43	21	48	24	35	7	19	21	15	22
Ft. Logan	—12	25	—10	10	—32	22	—3	1	19	4	32	1	37	1, 2	41	28	24	30	—2	5	—20	21
Glasgow	—15	23, 24	—18	19	—27	27	6	1	36	18, 27, 30	30	2	44	30	41	1	31	5, 29	11	4	—14	20
Glendive	—7	24	—15	19	—13	21	16	1	32	1	45	3	44	20	45	1	34	8	22	21	—15	21
Glenwood	—7	24, 26	3	2	—22	22	13	1	22	4	34	4, 26, 28	33	1, 2	39	23	26	6	14	3	—15	21
Great Falls	Z 0	24	—8	19	—15	26	17	1	30	4	39	1	45	4, 20	48	23	36	30	21	4	—7	21
Havre	—14	24	—12	19	—20	26	—1	1	29	2	38	2	44	20	43	23	32	12	9	7	—7	20
Helena	—1	24	—1	19	—16	22	14	1	36	4	37	3	36	1	46	23	32	30	21	4	—10	21
Kalispell	—8	10	5	2, 19	—16	21	12	1	40	23	45	1	50	1, 3, 19	40	31	32	6, 7, 24	21	3, 4, 8	7	25
Kipp	—18	24	—21	19	—26	26	—13	1	19	4	29	1, 26	37	8	38	1, 5, 23	23	10	—1	25	—20	21
Lewiston	—9	23	—10	19	—19	22	7	1	24	4	32	1	....	.....	....	.....	....	.....	....	.....	....	.....
Livingstown	—4	10	10	10	—15	22	13	1	28	2, 3, 5	36	2	30	1, 2	44	31	27	9	19	4	—10	21
Manhattan	—18	25	3	1	—23	22	18	4	25	3	33	29	34	2	37	25, 26	22	29, 30	15	8	—24	21
Martinsdale	—10	10	2	2	—18	22	8	1	26	3	33	1	36	1	38	27	25	10	3	4	—18	21
Marysville	—4	24	5	2	—13	22	11	1	22	2	35	2	34	1	40	31	28	30	14	4	—13	21
Miles City	—10	25	—9	2	—13	22	12	1	30	4	45	1	43	20	52	2	34	10	22	21	—12	22
Missoula	—4	29	5	1	1	26	23	19	27	2	....	.....	41	1, 2	42	31	35	6	22	7	10	21
Parrot	—5	9	7	1	—16	21	20	3	26	3	36	3	39	1	43	22	30	30	....	.....	—12	20
Plains	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	34	6	....	.....	14	9
Poplar	—9	23	—21	19	—22	28	11	1	32	1	42	13	40	30	45	6	30	8	14	20	—22	21
Radersburg	—10	26	Z 0	2	—5	26	9	3	29	6	30	3	35	4	40	3, 4, 5, 31	23	30	13	3	....	.....
Red Lodge	....	.....	—2	2	—21	22	5	1	24	3, 5	33	29	....	.....	....	.....	....	.....	....	.....	—7	21
St. Ignatius	—2	25, 29	8	3	—10	22	25	1	20	5	37	2	....	.....	44	31	31	23	21	7	10	26
St. Paul	—10	24	—11	20	17	26	6	1	28	2	32	3	40	1, 19	41	6	29	30	11	21	—13	21
Shelby	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	—18	21
Troy	5	29	10	20	—2	22	21	1	26	1	34	3	37	1, 2, 6, 7	39	29	29	6	....	.....	16	25, 26
Utica	—4	24	—9	19	—18	22	5	1	22	4	34	3	33	2	41	23	26	29	5	4	—19	21
Virginia City	—8	24	7	19	—15	22	15	1	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....	....	.....
Wibaux	—10	20, 25	—19	17	—20	26, 27	10	1, 2, 4	24	1	37	2	32	20	42	8	....	.....	....	.....	—20	22
Yale	8	24	—5	2	—10	22, 23, 25	4	1	28	4, 6, 7	34	1	35	20	40	3	22	30	9	25, 26	—18	21

Note—Tables of temperature and precipitation normals may be found in the miscellaneous department of this volume.

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TEMPERATURE NORMALS.

Stations	No. of years.	Jar.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Normal
Billings	5	24.8	31.4	33.5	52.7	51.7	62.9	71.3	79.1	60.5	51.1	29.1	29.5	47.8
Boulder	6	17.0	20.6	27.8	40.4	49.6	56.0	61.2	63.8	51.2	42.1	30.0	23.7	40.3
Bozeman	6	20.8	22.6	27.7	41.4	51.2	58.7	65.4	65.0	54.5	44.4	31.1	24.0	42.2
Butte	.....	27.2	24.7	24.5	39.7	49.0	55.4	62.7	64.7	51.9	44.3	30.0	24.2	41.5
Choteau	7	22.5	20.2	28.1	41.6	52.0	58.8	65.5	65.2	53.5	45.9	27.4	30.1	42.5
Columbia Falls	5	22.6	28.0	29.4	43.2	52.9	58.2	64.6	67.4	51.5	42.5	32.2	24.8	43.1
Crow Agency	8	20.0	17.7	29.5	47.1	56.5	63.9	71.6	71.8	59.8	48.8	31.7	24.5	45.2
Dearborn Canyon	7	29.8	24.4	25.2	40.2	49.5	56.8	63.5	64.3	53.7	45.0	28.2	27.5	41.6
Deer Lodge	11	20.8	24.6	29.8	40.7	49.8	59.5	64.7	60.6	51.7	39.4	30.1	21.6	41.1
Fort Benton	16	17.2	24.3	29.7	46.0	57.2	64.1	70.6	68.4	58.2	47.6	29.2	21.4	44.5
Fort Keogh	21	12.0	15.7	29.3	46.4	56.6	67.0	73.5	71.8	59.8	45.7	29.2	19.6	43.9
Fort Logan	10	16.9	17.8	26.2	39.1	47.7	55.6	52.8	62.7	51.5	41.9	28.9	20.3	39.2
Glasgow	5	6.5	11.1	20.2	45.6	58.5	63.9	71.7	68.5	56.1	42.5	29.5	16.9	46.1
Glendive	10	12.3	14.1	25.1	47.4	58.5	66.8	73.1	72.3	60.8	47.6	27.2	21.6	43.9
Great Falls	7	24.8	29.1	32.7	46.7	54.5	61.6	68.5	67.6	57.0	49.1	30.5	30.6	40.1
Havre	6	13.3	16.4	23.4	44.9	52.5	60.3	66.5	66.5	59.2	45.0	26.4	20.4	41.2
Helena	19	17.5	21.3	30.8	43.7	52.0	59.4	66.9	66.8	56.0	45.0	30.9	24.8	42.9
Kipp	5	17.5	22.8	22.8	39.7	49.7	55.5	61.6	58.1	49.1	39.8	22.9	24.8	38.7
Martinsdale	8	22.1	22.6	27.8	42.1	51.0	58.2	66.1	65.4	53.5	43.7	30.3	26.5	42.4
Marysville	5	20.4	26.4	23.8	41.0	49.2	55.4	62.9	64.2	51.0	42.8	27.7	25.1	40.8
Miles City	5	12.0	15.0	25.4	46.2	57.4	65.8	72.8	71.5	62.7	46.8	25.2	23.9	43.7
Missoula	19	19.4	24.8	33.1	44.4	54.2	59.8	66.7	65.6	55.3	44.8	31.3	24.1	43.6
Poplar	14	3.0	6.2	21.4	43.0	54.0	63.7	69.2	66.6	56.9	43.4	24.1	13.0	38.7
Utica	5	21.7	26.8	24.9	43.0	51.4	58.5	65.2	67.0	54.3	44.1	28.2	27.8	42.7
Virginia City	10	21.3	23.0	28 8	41.0	49.0	56.0	64.4	64.8	53.8	44.9	31.1	24.8	41.9
Wibaux	6	15.3	22.8	27.6	47.1	55.8	64.3	69.3	68.0	56.7	45.7	27.3	23.8	43.6

PRECIPITATION NORMALS.

Stations	No. of years.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Mean
Billings	5	0.83	0.25	1.25	1.18	2.40	3.08	0.79	1.12	0.61	1.12	1.67	0.32	14.65
Boulder	6	0.78	0.13	0.22	0.89	1.41	2.54	0.83	0.34	1.28	0.38	0.35	0.17	09.34
Bozeman	6	0.83	0.58	0.96	1.46	2.48	2.77	1.66	0.44	2.11	1.37	1.06	0.82	17.54
Butte	5	0.75	0.44	0.80	0.77	1.24	1.96	1.17	0.54	1.29	0.60	0.90	0.55	11.01
Choteau	7	1.32	1.12	0.95	0.70	2.10	3.13	1.52	0.86	1.14	0.67	1.30	0.71	15.52
Columbia Falls	5	2.10	1.36	1.44	1.25	1.82	2.43	1.52	0.95	2.98	0.87	4.36	0.75	21.83
Crow Agency	19	0.83	0.47	0.71	1.30	2.22	3.01	1.31	0.90	0.82	1.18	0.77	0.59	14.13
Dearborn Canyon	6	1.56	1.14	1.00	1.39	1.53	2.80	0.70	1.18	1.29	0.72	1.43	0.77	15.60
Deer Lodge	11	0.86	0.49	0.74	1.08	1.73	2 71	0.98	1.19	0.94	0.90	0.75	0.59	12.96
Fort Benton	19	0.70	0.46	0.54	1.19	2.53	2.43	1 77	0.89	0.90	0.69	0.59	0.58	13.27
Fort Keogh	21	0.56	0.54	0.67	1.10	2.16	2.79	1.12	0.87	0.73	0.70	0.56	0.34	12.14
Fort Logan	10	0.59	0.37	0.82	1.01	2.02	2.27	1.17	0.55	1.03	0.82	1.13	0.37	12.13
Glasgow	5	0.55	0.66	1.76	1.46	1.20	2.16	0.57	0.31	0.37	1.29	0.83	0.41	11.66
Glendive	10	0.83	0.56	1.24	1.44	2.62	3.77	1.40	0 53	1.08	1.10	0.51	0.53	15.93
Great Falls	1	0.72	0.45	0.83	1.15	2.03	3.39	1.56	0.41	1.05	0.59	1.02	0.46	13.67
Havre	17	0.90	0.53	0.52	0.95	1.64	3.22	2.03	1.28	1.12	0.62	0.79	0.54	14.14
Helena	18	0.22	0.77	0.79	1.10	1.77	2.46	1.12	0.64	1.19	0.84	0.89	0.87	12.62
Kipp	5	0.77	0.98	1.83	1.46	2.76	3.40	1.35	1.22	2.32	1.22	2.15	0.78	20.24
Martinsdale	8	1.33	0.86	1.07	1.16	2.10	3.26	1.86	0.63	1.55	0.90	1.45	0.77	16.94
Marysville	5	1.29	1.11	1.38	0.99	2.64	3.01	1.59	1.05	1.38	0.99	1.95	1.26	18.39
Miles City	5	0.62	0.46	1.70	1.43	2.72	2.26	0.81	0.30	0.67	1.01	0.56	0.38	12.92
Missoula	26	1.73	0.96	0.54	0.96	1.86	2.23	1.07	0.77	1.12	1.37	1.46	1.61	15.68
Poplar	15	0.65	0.49	0.78	1.05	1.67	2.87	1.75	0.73	0.72	0.81	0.96	0.43	12.91
Utica	5	0.41	0.31	0.95	0.74	2.47	4.07	1.99	0.75	0.95	0.98	1.75	0.44	15.81
Virginia City	11	0.54	0.58	1.15	1.22	2.74	2.53	1.29	1.17	1.42	0.88	0.86	0.78	15.10
Wibaux	5	0.69	0.23	0.79	1.19	2.52	3.94	2.32	0.52	0.64	0.22	0.80	0.25	14.11

There are no soils so productive as those of the arable lands of this state.

Commissioner Hermann, of the Interior Department, says in his annual report that the soils of the arid regions are remarkable for their uniform character over large areas. They are generally light in texture and easily worked. The aridity of the climate retards the kaolinization of the minerals and there is little clay, therefore, in their composition. All arid regions have, therefore, in greater or less extent, peculiar dust soils which have a remarkable power of conserving water unknown in the compact heavy clay lands of the humid regions. The soils of the arid regions are very deep as a rule, and there is little or no difference in appearance or agricultural value between the soil proper and the subsoil. They are almost universally known as very strong soils.

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The aridity of the climate has a still more important effect, however, upon the character of the soils. In the decay and disintegration of the rocks from which the soils were derived the salts forming the mineral food of plants have not been removed as in the humid regions. Investigations have shown that there are three times as much potash and soda on the average in the soils of the arid regions as there are in the humid regions, and from six to ten times as much magnesium and lime. In fact, the soils of the arid regions are nearly always strongly calcareous soils which, as a class, are recognized the world over as being among the most fertile of upland soils. The amount of humus in these soils is generally less, but the nitrogen content of the humus is about three times larger than in the humid region, so that the active nitrogen content of the soils of the arid regions is very much larger.

These characteristics, which are the direct result of the aridity of the climate, have provided a soil which is easy to work, which is generally very retentive of moisture, and which is uniformly admitted to be stored with plant food.

There is no question whatever as to the productiveness of these lands if water can be applied through judicious systems of irrigation. The experience of settlers all over the arid regions show conclusively that under irrigation the lands become exceedingly productive.

There is no doubt that these lands need comparatively little water when irrigated. There are many large areas in Montana where soils once thoroughly moistened by the winter rains will support a crop throughout its growing period without additional rainfall. There is little loss from underdrainage and from this fact alone it is a common experience in the semi-arid regions of ,Kansas and Nebraska that, with 20 inches of well-distributed rainfall, the conditions are as favorable as with 40 inches of well-distributed rainfall in the east.

It is a very common experience that the usual application of water is excessive Many large areas of land in all of the arid regions which have been under irrigation for a period of eight or ten years are suffering from overirrigation, apparent in the accumulation of seepage waters and alkali salts. In many areas the amount of water now used would better be used over two or three times in the extent of surface.

On account of the large amount of soluble salts remaining in the soils, as the result of the aridity of the climate and the small loss by drainage as the soils were forming and since, there are large areas where these salts have accumulated, and there are still other areas where there is danger of the rise of alkali through injudicious methods of overirrigation.

The most destructive form of alkali is the sodium carbonate, and this does not occur in Montana. Gypsum, its corrective, however, is found in great quantity.

Seeing the development that has been wrought in the arid west, realizing that in many of the western states the agricultural and pastoral wealth now exceeds the mineral output of their mountains, with the government still possessing over 300,000,000 acres of most fertile, and yet for the time being arid, lands, the possibilities of the future are almost beyond the scope of imagination. Water is all that is needed, and of this precious element millions and hundreds of millions of acre-feet are annually allowed to go to waste, which if stored and intelligently used would be the means of supplying homes to millions of settlers.

In a recent interview in the east, U. S. Senator T. H. Carter said: "Montana is going into agriculture. Before the new century is ten years old Montana will be producing annually more wheat and flour than any other two states in the union and we shall sell it in the Asiatic markets. Instead of shipping our wheat east we are shipping it west, and now mills are springing up in every direction to turn it into flour

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for the oriental market. We have 40,000 square miles of the best soil in the world for wheat culture, and with irrigation it will produce an average of forty bushels to the acre year after year, indefinitely. We had last year only about 60,000 acres under cultivation, but as soon as we get storage reservoirs in the mountains, upon which we are safe in depending for a water supply, tens of thousands of people will be coming into the country to cultivate the ground."

Senator Carter was asked if Montana was prosperous. "No section of God's footstool enjoys greater prosperity," was the answer. "We have 200,000 people in Montana whose income last year from the mines—gold, silver, copper and lead—was about $75,000,000, and from wool, mutton and beef $15,000,000, making a total of $90,000,000 profit from these two sources alone. Everybody is busy; everybody is hopeful; everybody is contented. Railway construction has been resumed and we shall lay more track this year than during the last five years."

IRRIGATION BY THE STATE.

The Semi-Arid Lands to be Watered—The Strongest and Most Productive Soils to be Reclaimed at Cost to the Actual Settler.

While there are some lands that can be cultivated without artificial watering, as is stated in the articles on several of the counties where the precipitation of moisture is considerably more than is general throughout the state, some of the best localities, with the richest soils and offering the most advantageous opportunities, must be irrigated before the production of crops can be made certain for every year.

Montana proposes that the settler shall not only have the benefit that arises from a perfect control of an abundant supply of water, but that he shall secure his irrigation, together with the most complete and modern irrigation system and perpetual water rights, at actual cost, relieving him of the large bonus charged by the private companies and the exhorbitant and perpetual annual rental—items that mount into the thousands of dollars for each settler as the years roll by.

To aid in the more rapid development of the agricultural resources, the state has undertaken, under the Carey state land grant and irrigation act, supplemented by ample local authority, to reclaim such of its arable lands as may be watered within an average cost of $15 per acre, and the state commission that has the work in charge, is now ready to start active operations in two districts and making arrangements for a third, and during this year and the two following years will undoubtedly have several hundred acres of the finest farm lands on the continent artificially watered, placed in condition for the abundant production of any crop, making a failure an impossibility by removing the chances of freakish rainfall that is encountered by the middle-state and eastern farmer, and ready for the actual settler—for the man who desires to establish a permanent home. The reader has noted what Commissioner Herman has said of these lands, in the quotations made from him in the pages toward the front of this book, so that nothing more need be mentioned in their favor—they are the best.

By reference to the Carey act, not included in this volume, it will be seen that the state has been given one million acres of land on condition that it be properly reclaimed by the construction and completion of a water system for its irrigation. The state has undertaken to do this through the agency of the State

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Arid Land Grant Commission, which was created in 1895 by an act of the legislature, and was given power to issue bonds of the state, to cover the cost of such reclamation. These are known as "special assessment" bonds, being secured by the land reclaimed, the water system and other appurtenances belonging. Should the interest by any chance not be paid when due, the coupons may be registered at the office of the state treasurer, and will thereafter draw six per centum per annum interest. The land, after segregation has been secured, is surveyed by the commission, with a view to its proper classification, based on the depth and character of the soil, the degree and smoothness and slope of the surface and its proximity to the water supply, to a home market point and to railway facilities. When this has been done the cost of reclamation is assessed against each 40-acre tract, according to its classification, and to this is added 20 per cent. The land is then ready for sale to actual settlers in tracts containing not more than 160 acres. When land is selected by the purchaser, a certificate of selection is issued to him, as is shown below. The terms of sale may vary in different districts, but otherwise the form will accord with this. When the terms of this certificate are fully complied with, a patent or deed will issue to the purchaser from the state, as in other public land purchases. During the life of this certificate, the land will not be subject to taxation, as title is either in the government or the state—the effect being to aid the settler to develop his land without having to pay a penalty for so doing. The bonds previously described will be received by this commission in payment for land. The law has empowered the commission to fix and determine a certain rate, or annual charge, against the land benefited by the system, for the maintenance and operation of the irrigation plant, which charge shall not exceed the actual cost of such maintenance and operation, economically administered, together with the cost of necessary improvements. The commission in the name of the state and on behalf of the settler, exercises complete control of all matters pertaining to the canal or water supply of the district; the intent of the Carey act and the laws of the state being to prepare homes for those who want them, at actual cost, without profit to itself or middlemen, and to see that each tenant receives the water he may be entitled to without interference from any source. While undoubtedly the building of these water sources could be done at less cost if the state would do the work on a cash basis, the fact that it will never be done in that way justifies recourse to the law now in force. Scattered over the state are numerous little valleys possessing rich soil, good water supply, local market and all the desirable elements, which this commission will shortly commence to reclaim and prepare for settlement.

There have been two irrigation districts established—one at Billings, in Yellowstone county, at the junction of the Northern Pacific and the Burlington & Missouri railways, which comprises 22,500 acres, including railroad lands; the other is near Big Timber, in Sweet Grass county, a description of which may be seen in the reference to that county made in the concluding article of this volume. Work will begin in both these districts shortly, and those desiring information regarding these lands should address Mr. Donald Bradford, field member of the Arid Land Commission, Helena, Montana.

Following are given the terms of sale, conditions, forms of certificate, and other information that will more fully explain the intention of the law and the purposes of the commission:

Terms of Sale.—The purchase price hereof shall be due and payable ten years from the date of the first issue of the bonds of this district. Annual interest shall be due and payable in advance beginning with the date hereof, as is more fully shown upon a certaincoupon note this day executed by the purchaser. Bonds of the district with accrued interest will be received at any time in payment of principal

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or interest. Settlement shall be made upon the land by the purchaser according to law.

Use of Water.—The commission shall regulate the flow of water according to crop requirements and waste of water will not in any instance be permitted.

Tolls.—All expenses incurred on account of the administration and maintenance of District No. 2 shall be charged according to law.

Miscellaneous.—The district superintendent shall have full control of the entire district system, subject to the orders of the commission.

Montana State Arid Land Grant, Certificate of Selection, No. .....

District No. 2.

Amount $..... Helena, Montana, ...189..

This is to certify that ....., of the county of ....., and state of ....., has duly filed with the Montana State Arid Land Grant Commission, at its office in the city of Helena, notice of the selection of ..... containing..... acres of land, at $..... per acre.

This selection is made subject to the conditions and regulations printed herein and made a part of this instrument.

Signed.....

Conditions of Sale of Lands and Water Right Lien.

The land and water right herein designated are and shall be subject to a lien as set forth in An Act of the Legislature of the State of Montana, entitled "An Act to Amend Sections 3530 to 3547 inclusive, Article II, Title VIII, Part III, of the Political Code of the State of Montana, Creating the State Arid Land Grant Commission and defining its powers and to add thereto Sections 3548, etc." Approved March 8, 1897, until the entire purchase price thereof and interest thereon at the rate of six per cent per annum is fully paid.

The Public Lands.

The latest report of the general land office gives the vacant lands of the state as follows: 16,923,837 acres surveyed, 54,674,779 acres unsurveyed, 11,424,213 acres reserved, and 12,227,891 acres appropriated, a total vacant area of nearly one hundred million acres. A large portion of the unsurveyed area will be surveyed during this year, the demand for surveying of the lands increasing every year and being noticeably so this year, and the appropriation made for the work was largely increased. The unappropriated lands are divided between the counties as follows:

Counties.	Area Unappropriated and Unreserved.			Area Reserved	Area Unappropriated.	Total Area of Land Surface in County.
	Surveyed.	Unsurveyed	Total			
Beaverhead	499,930	2,155,759	2,655,689	2,800	320,511	2,979,000
Broadwater	145,600	340,000	485,600	.....	218,400	704,000
Carbon	221,811	1,272,488	1,494,299	.....	78,701	1,573,000
Cascade	757,840	448,640	1,206,480	47,250	649,500	1,903,230
Choteau	4,082,843	4,894,201	8,977,044	790,250	532,706	10,300,000
Custer	1,817,763	8,106,393	9,924,156	415,280	1,860,564	12,200,000
Dawson	807,886	7,528,794	8,336,680	135,640	70,680	8,543,000
Deer Lodge	239,831	1,703,020	1,942,851	.....	688,149	2,631,000
Fergus	2,605,433	2,142,705	4,748,138	173,920	752,942	5,675,000
Flathead	538,684	4,215,882	4,754,566	173,333	641,101	5,569,000
Gallatin	86,688	570,008	656,696	.....	1,008,304	1,665,000
Granite	121,540	814,928	936,468	.....	59,532	996,000
Jefferson	152,470	680,830	833,300	.....	217,700	1,051,000
Lewis and Clarke	276,000	1,031,500	1,307,500	.....	495,000	1,802,500
Madison	730,011	1,632,500	2,362,511	20,550	503,939	2,887,000
Meagher	618,293	1,350,169	1,968,442	42,027	639,531	2,650,000
Missoula	168,089	3,289645	3,457,734	1,333,333	366,933	5,158,000
Park	252,221	1,175,121	3,427,342	.....	370,658	1,798,000

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Counties.	Area Unappropriated and Unreserved.			Area Reserved	Area Unappropriated	Total Area of Land Surface in County.
	Surveyed	Unsurveyed	Total			
Ravalli	61,242	1,502,000	1,563,242	.....	286,758	1,850,000
Silver Bow	41,000	370,000	411,000	.....	99,000	510,000
Sweet Grass	446,010	900,473	1,346,483	15,360	479,157	1,841,000
Teton	1,727,600	1,196,700	2,924,300	1,400,000	378,707	4,703,000
Valley	684,483	5,768,384	6,452,867	2,069,100	53,033	8,575,000
Yellowstone	604,808	668,661	1,273,529	24,320	1,072,151	2,370,000
Crow Reservation	.....	.....	.....	3,731,000	.....	3,731,000
Total	17,688,116	53,744,801	71,432,917	10,780,433	11,843,650	94,057,000

The are local United States land offices at Helena, Missoula, Miles City, Bozeman, Lewistown and Kalispell, making it convenient for the settlers of any portion of the state to attend to the location and final settlement of their lands.

As with the local land offices connected with the state department, the United States land offices of Montana have experienced a comparatively busy year. For the fiscal year ending June 30, 642,320 acres of land in the Helena district were examined and classified, in the Missoula district 1,365,560 acres, and in the Bozeman district 836,250 acres.

The territory included in the new Kalispell land district is as follows: Beginning at a point on the national boundary line where the same would be intersected by the range line between ranges 14 and 15 west of the Montana principal meridian when projected (this line being the present boundary between the Helena and Missoula land district); thence south on said range line between ranges 14 and 15 west to the southeast corner of township 22 north, range 15 west; thence west on township line between townships 21 and 22 north to the southwest corner of township 22 north, range 23 west; thence north on range line between ranges 23 and 24 west to the sixth standard parallel north; thence west on said standard parallel to the southwest corner of township 25 north, range 26 west; thence north on range line between ranges 26 and 27 west to northwest corner of township 26 north, range 27 west; thence west on township line between townships 26 and 27 north to the northeast corner of township 26 north, range 30 west; thence north on range line between ranges 29 and 30 west to the northeast corner of township 27 north, range 30 west; thence west on township line between townships 27 and 28 north to the northwest corner of township 27 north, range 31 west; thence north on range line between ranges 31 and 32 west to the seventh standard parallel north; thence west along the seventh standard parallel north to the western boundary of the state; thence north on said boundary line to the northwest corner of the state on the national boundary line on the forty-ninth parallel, north latitude; and thence east on said national boundary line to the place of beginning.

The past year has been one of activity in the State Land departments, the State Board of Land Commissioners in their official report for the year saying that, "The fiscal year just closed has been most gratifying to the state land department. The receipts accruing from the leasing of state lands have doubled the rentals of the preceding year. The spirited and persistent demands made for state lands; the numerous petitions for the selection of vacant lands by the state, and the promptness with which lessees have paid their rentals during the year, are flattering indications of the favorable condition of the husbandman and the flockmaster.

"The state land agent and his corps of three assistants have visited and appraised all the state lands in the counties of Choteau, Teton, Valley, Lewis and Clarke,

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Deer Lodge, Granite, Cascade, Silver Bow and the remaining portion of Custer, comprising 632,236.2 acres, thereby completing the appraisement of the entire state.

In addition to the lands appraised during the year, there have been selected to the credit of the various grants 112,299.26 acres, making a total of 724,535.49 acres examined. With the exception of 8,090.38 acres of timber lands, all the selections made are under lease or have been applied for, and none is now being selected that will not return a rental of $80 per section per annum.

"The total amount of land selected to the credit of the several grants is 580,522.09 acres, leaving 87,578.69 acres yet to be selected. Of the seven grants made to the state by the federal government, the University and the Deaf and Dumb Asylum grants have been satisfied.

"In addition to the 87,578.69 acres of granted lands to be selected there are 54,730.86 of indemnity school lands awaiting selection, making a total of 142,309.55 acres to be selected.

"While the board has experienced the strong demands made upon it for grazing and agricultural lands, the same can be said of the demands for timber lands. During the year the receipts from the sale of timber amounted to $15,123.96, a stumpage which netted nearly $2 per M.

"In view of the magnificent growth of business transacted by the State Land Office since its establishment in 1895, a faint conception of the magnitude of the work before it, and the vast extent of the state's heritage, is had when we compare the 2,179,000 acres of state land now under the control of the State Department, with the 5,668,000 acres that will be secured when all the grants have been satisfied and all the surveys completed within the state."

A Statement by Counties, Showing Area of Unappropriated Lands.

Land District	County.	Area unappropriated and unreserved.			Area reserved.	Area appropriated	Total area of land surface of the county in land district	Brief description of character of unappropriated and unreserved land
		Surveyed.	Unsurveyed.	Total.				
		Acres	Acres	Acres	Acres	Acres	Acres	
Bozeman	Broadwater ...	39,000	30,000	69,000	.....	65,000	134,000	Principally arid.
	Carbon	221,811	1,233,488	1,455,299	.....	78,701	1,534,000	One-third good farming land, two-thirds mountainous.
	Crow Reserva..	.....	.....	.....	321,000	.....	321,000	No vacant public land.
	Gallatin	80,928	523,528	604,456	.....	1,002,544	1,607,000	One-fourth good farm land, three-fourths mountainous.
	Jefferson	49,200	26,000	75,200	.....	69,800	145,000	Principally arid.
	Madison.....	385,461	650,000	1,035,461	.....	239,539	1,275,000	One-fourth arid, three-fourths mountainous.
	Park.	248,021	1,128,821	1,376,842	.....	361,158	1,738,000	One-third good farm land, two thirds arid and mountainous.
	Sweet Grass....	326,925	852,021	1,178,946	.....	325,054	1,504,000	Grazing and mountainous
	Yellowstone....	203,630	166,054	369,684	.....	750,316	1,120,000	Arid and mountainous.
	Total.	1,554,976	4,609,912	6,164,888	321,000	2,892,112	9,378,000	
Helena	Beaverhead	448,100	1,521,400	1,969,500	2,800	236,700	2,209,000	Mountainous and grazing.
	Broadwater.....	106,600	310,000	416,600	.....	153,400	570,000	Mountainous and agricultural.
	Cascade	757,840	448,640	1,206,480	47,520	649,500	1,903,500	Grazing and agricultural.
	Choteau	3,982,350	4,446,400	8,428,750	790,250	530,000	9,749,000	Do.
	Deer Lodge	237,200	1,619,800	1,857,000	.....	670,000	2,527,000	Mountainous, some agricultural.
	Fergus	.....	28,000	28,000	.....	.....	28,000	Grazing.
	Gallatin	5,760	46,480	52,240	.....	5,760	58,000	Mountainous.
	Granite.....	102,400	345,000	447,400	.....	40,600	488,000	Do.
	Jefferson.	103,270	654,839	758,100	.....	147,900	906,000	Mountainous, some grazing.
	Lewis & Clarke.	276,000	1,031,500	1,307,500	.....	495,000	1,802,500	Mountainous and agricultural.
	Madison.....	344,550	982,500	1,327,050	20,550	254,400	1,612,000	Mountainous.

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Area of Unappropriated Lands—Continued.

Land District	County.	Area unappropriated and unreserved.			Area reserved.	Area appropriated	Total area of land surface of the county in land district	Brief description of character of unappropriated and unreserved land.
		Surveyed.	Unsurveyed.	Total				
		Acres	Acres	Acres	Acres	Acres	Acres	
Helena	Meagher.	321,100	1,268,060	1,589,160	2,840	438,000	2,030,000	Grazing and agricultural.
	Park.	4,200	46,300	50,500	.....	9,500	60,000	Grazing.
	Ravalli	.....	46,000	46,000	.....	.....	46,000	Mountainous.
	Silver Bow	41,000	370,000	411,000	.....	99,000	510,000	Do.
	Sweet Grass ..	2,500	39,900	42,400	.....	6,600	49,000	Grazing.
	Teton	1,727,600	1,182,700	2,910,300	1,400,000	378,700	4,689,000	Do.
	Total.	8,460,470	14,387,510	22,847,980	2,263,960	4,125,060	29,237,000	
Kalispell	Deer Lodge	.....	54,000	54,000	.....	.....	54,000	Mountainous, timber, grazing.
	Flathead.	538,684	4,169,882	4,708,566	173,333	641,191	5,523,000	Valleys, mountains, timber, grazing.
	Missoula	.....	14,000	14,000	.....	.. ..	14,000	Timbered valleys and mountains.
	Teton	.....	.....	.....	406,000	.....	406,000	No vacant public land.
	Total.	538,684	4,237,882	4,776,566	579,333	641,101	5,997,000	
Lewistown ..	Choteau	10,301	140,899	151,200	.....	800	152,000	Broken, grazing.
	Custer.....	35,286	198,004	233,290	1,280	13,430	248,000	Do.
	Dawson	234,469	439,513	673,982	15,360	47,658	737,000	Do.
	Fergus	2,605,433	2,114,705	4,720,138	173,920	752,942	5,047,000	Grazing, farming, timber and mountainous.
	Meagher.	297,173	82,109	379,282	39,187	201,531	620,000	Farming and grazing.
	Sweet Grass	116,585	8,552	125,137	15,360	147,503	288,000	Do.
	Yellowstone....	201,757	168,797	370,554	24,320	189,126	584,000	Grazing.
	Total	3,501,004	3,152,579	6,653,583	269,427	1,352,990	8,276,000	
Miles City ..	Carbon	.....	39,000	39,000	.....	.....	39,000	Broken, grazing.
	Choteau.....	90,192	306,902	397,094	.....	1,906	399,000	Agricultural and grazing, principally graz.
	Crow Reserva..	.....	.....	.....	3,410,000	.....	3,410,000	Do.
	Custer.....	1,782,477	7,908,389	9,690,866	414,000	1,847,134	11,952,000	Do.
	Dawson.....	573,417	7,089,281	7,662,698	120,280	23.022	7,806,000	Do.
	Valley.	684,483	5,768,384	6,452,867	2,069,100	53,033	8,575,000	Do.
	Yellowstone....	199,481	333,810	533,291	.. ..	132,709	666,000	Do.
	Total	3,330,050	21,445,766	24,775,816	6,013,380	2,057,804	32,847,000	
Missoula	Beaverhead.	51,830	634,359	686,189	.....	83,811	770,000	Arid.
	Deer Lodge	2,631	29,220	31,851	.....	18,149	50,000	Mountains, timber, grazing.
	Flathead.	.....	46,000	46,000	.....	.....	46,000	Small valleys, mountains, timber, grazing.
	Granite.....	19,140	469,928	489,068	.....	18,932	508,000	Mountains, timber, minerals.
	Missoula.	168,089	3,275,645	3,443,734	1,333,333	366,933	5,144,000	Small valleys, mountains and timber.
	Ravalli	61,242	1,456,000	1,517,242	.....	286,758	1,804,000	Do.
	Total	302,932	5,911,152	6,214,084	1,333,333	774,583	8,322,000	
	Total in Mont ..	17,688,116	53,744,801	71,432,917	10,780,433	11,843,650	94,057,000	

The Sheep Industry.

The very favorable reports of one year ago, that showed an almost universal bill of health among our sheep, will be followed by disappointment in the fact that so many serious cases of scab have appeared during the past year, requiring heroic measures to successfully eradicate the infection. In every case where scab has appeared it has been traced to animals imported into the state from abroad or transported through the state. Neighboring states may think us unreasonably particular and severe in quarantining against them and refusing unrestricted ingress and transit for their flocks, but our experience the last season is abundant reason for the caution now being exercised. Our efforts to eradicate disease among our own flocks was devoid of results so long as there was an open door to its introduction from outside the state.

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Efforts are being made, with promise of success, to have the transportation companies not only use disinfected cars, but to maintain separate yards for the unloading of sheep for feeding while in transit through the state, as well as for those brought in to remain, until it is known that they are free from infectious disease.

It is a cause for much congratulation that all reported cases of scab have been so promptly and successfully coped with, and the past record of our state in this direction will be maintained. For the accomplishment of this result, the inspectors are deserving of much praise.

In the annual report the State Board of Sheep Commissioners say the lamb crop was not as large this year as in many former years. The early rains were unfavorable for lambs, though beneficial for grass. These rains, which were unprecedented for this section, washed out the fleeces so that the average weight when sheared was below the average of former years. We can confidently say that there was a fair increase in flocks after deducting all losses and sales. Continuing, the report says that the later and present market prices of wool have been disappointing, though opening sales were at fair prices, showing an advance of 2 1-2 cents to 3 cents over the previous year. The mutton market has been exceptionally good and the price inducement has resulted in a large sale of this class of sheep. The report says the increase of our population will increase the demand for mutton, and our sheep men will do well to heed this fact in paying more attention to raising mutton sheep. The hope and prospect of an improved wool market in the near future has had some restraining influence upon the disposition to sell in order to realize from the advanced price of sheep. New men both within and from without the state are entering the business to share in prospective profits.

The past year more than any previous one has witnessed a tendency on the part of our sheepmen to acquire title to and enclose their ranches. The cost of purchase, fencing and increase of taxes is partly recompensed by lessened risks of loss, greater security in range and food and some reduction in the expense of herding.

The commissioners' report concludes by saying in part: "Against our healthy climate, rich natural grass and other advantages we must count on higher wages prevailing in a mining state, enhanced cost of supplies and distance from markets. To make the most of our advantages and reduce to the minimum our disadvantages, affords an ample and fruitful field for cultivation. Commendable efforts have been made the past year to improve the grade of our sheep, and with better times we may well expect these efforts will become more general and productive of better results."

On the 1st of March, last spring, there were 2,967,901 sheep assessed in the state, the valuation per head being placed at $2.52, making the total valuation $7,450,848, and the levy from this amount that provides a fund for the commission under discussion, will amount to $3,725.42, an increase of nearly $1,400. There is now a balance in the sheep indemnity and inspection fund of $4,581.13.

The sheep commission reports 3,146,868 sheep in the state, 79,277 as being brought into the state since the first of last March; the number of lambs docked since that date 1,217,057, and the number of lambs and sheep slaughtered or sold and shipped out of the state since March 1, 583,320. The number of pelts sold since that period is placed at 450,296, the price ranging from 6c to 9 3-4c per pound. The number of pounds of wool for the season's clip is 22,916,603, and the highest and lowest prices received by the producer were 7 1-2c and 20c, the lowest average price being 13.44c and the highest average 16.86c, with a net average of 15.38c. Following is complete statistical information on the wool and sheep industry of the state, that will be found of interest to those who desire complete details.

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TABLE NO. 1.

Compiled from the Reports of the Sheep Commissioners.

County.	No. Sheep on hand March 1st, 1898	No. Sheep brought in from other States since March 1st, 1898	No. of Lambs docked since March 1st, 1898	No. of Lambs and Sheep slaughtered or sold and shipped out of the State since March 1st, 1898
Beaverhead	111,300	69	58,709	4,706
Broadwater	22,960	.....	12,485	8,240
Carbon	125,000	4,000	50,000	16,000
Cascade	118,615	.....	76,168	21,348
Choteau	539,958	2,800	165,000	130,000
Custer	209,250	.....	85,000	Est
Dawson	123,670	.....	65,750	8,500
Deer Lodge	63,780	4,500	26,538	16,390
Fergus	513,640	20,100	220,298	83,330
Flathead	215	.....	.....	.....
Gallatin	18,135	3,300	8,040	500
Granite	5,200	.....	1,950	Est
Jefferson	3,085	.....	.....	.....
Lewis and Clarke	48,173	2,500	17,000	Est 7,800
Madison	43,500	.....	14,814	6,877
Meagher	301,125	5,250	102,400	Est 102,400
Missoula	4,000	.....	1,500	.....
Park	50,983	.....	16,500	Est
Ravalli	20,212	.....	9,900	Est
Silver Bow	3,600	938	800	slaug'd 21,254
Sweet Grass	240,000	Rams 200	50,000	40,000
Teton	253,336	820	108,531	33,095
Valley	* 97,256	3,300	29,059	2,380
Yellowstone	† 229,875	31,500	96,015	80,500
Total	3,146,868	79,277	1,217,057	583,320

* About 50,000 sheep were driven through Valley County during the summer from North Dakota.

† In Yellowstone County 66,300 sheep, not included in the above, were brought into the County from other counties There were 2,500 rams sold out of Yellowstone County during the year.

TABLE NO. 2.

Compiled from the Reports of the Sheep Commissioners.

County.	No. lbs. pelts sold since March 1st, 1898	Av. price received for pelts per lb.	No. of lbs. of wool sheared since March 1st, 1898	Highest price received for wool per lb.	Lowest price received for wool per lb.	Average price received for wool per lb.
Beaverhead	6,750	8 ¼	875,710	.....	.....	15 ⅓
Broadwater	1,212	7 ½	171,379	16 ½	14 ¾	15 ¾
Carbon	15,000	8	875,000	.....	.....	15
Cascade	12,220	9 1-5	923,824	18	14	16 1-10
Choteau	29,000	9 ¾	4,185.000	17 ⅝	13 ¼	15
Custer	.....	.....	1,450,000	Est	.....	.....
Dawson	8,508	9	864,500	16	15	15 ⅛
Deer Lodge	22,650	8 ½	455,900	17	14 ½	15 ½
Fergus	76,640	9 1-10	3,800.936	17 ¾	14 ¼	16 3-10
Flathead	.....	.....	.....	.....	.....	.....
Gallatin	2,970	9	123,250	16	14	15 ¼
Granite	.....	.....	30,000	Est	.....	.....
Jefferson	.....	.....	19,500	Est	.....	.....
Lewis and Clarke	7,000	9 3-10	335,000	15 ⅜	15 ¼	15 ⅜
Madison	6,200	8	268,300	15 ½	12	14
Meagher	40,000	8 ¼	2,016,798	18	15 ¾	16 ⅝
Missoula	4,000	6	32,000	16	16	16
Park	.....	.....	321,000	Est	.....	.....
Ravalli	.....	.....	161,696	Est	.....	.....
Silver Bow	90.549	7 ½	20,393	15	13	14
Sweet Grass	60	9 ¾	1,716,000	17 ½	13	14 5-7
Teton	86,134	0.02	1,607,351	17 ¾	14.2	16 ⅛
Valley	6,893	8 ¼	717,454	16	9 ¼	14 ¾
Yellowstone	34,510	8 ½	1,825,710	20	7 ½	15 ½
	450,296 Total	8 ⅓ Gen'l Av.	22,916,603 Total	16.86 Gen'l Av.	13.44 Gen'l Av.	15.38 Gen'l Av.

MISCELLANEOUS ITEMS.

Sweet Grass County sheep yielded an average fleece of 7.15 lbs. per head.

The counties of Broadwater, Deer Lodge, and Lewis and Clarke report 331.100 lbs. of wool consigned on commission, divided as follows: Broadwater County, 80,000; Deer Lodge, 131,900; Lewis and Clarke, 119,200.

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The following information is compiled from returns received by this bureau, and the deductions may be considered well taken, as the figures are derived from individual replies to direct inquiry:

COUNTIES.	Total Sheep	Total lbs. wool.	Average wt. of fleece	Reported prices and amounts	
				Sold at per lb.	Lbs. reported sold
Beaverhead	62,630	427,400	6.82	$ .12	76,000
Broadwater	15,000	90,000	6.00	.13	50,290
Cascade	56,280	389,600	6.92	.13½	14,000
Choteau	93,120	682,830	7.33	.14	8,500
Custer	65,865	496,840	7.54	.14½	99,500
Dawson	45,735	346,240	7.57	.14⅜	48,600
Deer Lodge	34,600	253,000	7.31	.14¾	66,950
Fergus	167,330	1,228,615	7.35	.15	1,104,890
Lewis and Clarke	44,250	290,800	6.57	.15¼	292,820
Madison	28,930	224,380	7.75	.15½	527,410
Meagher	177,915	1,229,340	6.99	.15¾	254,710
Park	10,040	73,500	7.32	.16	1,090,510
Ravalli	1,040	8,850	8.51	.16¼	404,330
Sweet Grass	82,970	608,980	7.34	.16½	558,570
Teton	62,500	420,520	6.37	.16¾	420,500
Valley	33,215	275,600	8.29	.17	209,250
Yellowstone	50,110	430,360	8.58	.17½	83,550
....	.....	.....	....	.18	36,000
Totals	1,036,530	7,476,855	7.27		5,346,380

Total number sheep in the state, 3,146,868.

Taking the average yield of 7.27, as determined from the above returns, the total wool clip for the state this year is 22,877,730 pounds, yielding the sheep rancher about three and a half million dollars. As this estimate is made from the returns representing over a third of the sheep of the state, it can be taken as conservatively reliable. The average clip is shown to be heavier than the wool growers predicted during the earlier part of the growing season.

Discussing the wool clip for 1898, the Bulletin says the securing of estimate data has been conducted the same as in previous years. It is the outcome of correspondence with wool growers and wool dealers in every state of the Union; of consultation with manufacturers and wool merchants who have actually handled the new clip, and have given us their best judgment as to its relative quality and shrinkage. The estimate is a concensus of the opinion of the best informed persons, both in the mills, in the seaboard and in the primal markets. In the absence of more exact statistics, based upon some precise standard of measurement, such as may be utilized estimating the cotton crop, and annually determines the wool clip of Australia and South America—actual shipments and public sales—it is the best system that can be devised; and when conducted by the same methods for a long series of years, with a careful analysis of the variations which appear from year to year, it is sufficiently accurate for commercial purposes.

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NUMBER OF SHEEP REPORTED BY STATE AUTHORITIES AND BY UNITED STATES DEPARTMENT OF AGRICULTURE.

States		Assessors.	U. S. Dept. of Agriculture
Massachusetts	1897	*33,000	40,672
Ohio	1897	2,152,859	2,245,781
Iowa	1897	464,701	517,281
Indiana	1897	683,814	619,401
Maine	1898	241,001	226,851
Georgia	1898	*400,000	318,370
Kansas	1898	207,482	220,993
Texas	1898	2,103,683	2,520,068
North Dakota	1898	*350,000	342,793
Montana	1897	3,095,192	2,872,913
Montana	1897	**3,120,834	
Wyoming	1898	***1,555,371	1,703,338
Michigan	1898	1,338,060	1,312,018
Wisconsin	1898	*700,000	688,608

*Estimated. **Sheep Commissioners. ***Assessed.

The Stock Commission Report.

The report of the Stock Commission for this year is as follows: The past year has been an extraordinary one for the stock interests in many respects—particularly as to the extreme advance in the price of stock cattle. This was probably occasioned by the scramble for this class of stock by eastern feeders in the early spring, as the average advance in the beef market did not exceed five per cent over 1897, while stock cattle advanced fully 50 per cent. Because of the unusually high prices prevailing for young stock, a smaller number of cattle came into the state this past year than during any other year in the history of the stock industry of Montana. The total number brought in for 1898 will hardly exceed 15,000 head, a falling off of more than 75 per cent over the preceding year. Shipments of cattle from the state likewise fell considerable short of the average, although the output was swelled to a much larger figure than it would have otherwise been, by the cleaning up of several of the largest range herds. As it was, the shortage did not greatly exceed 10 per cent over 1897; but, as we said before, the total being greatly augmented by the cleaning up of these larger herds, the shortage will probably be more apparent next year, so far as shipments are concerned, notwithstanding the number of cattle in the state is no less than heretofore, the decrease being almost altogether in range herds.

From a climatic standpoint, 1898 has been one of the most favorable years ever experienced in Montana. The unusual amount of moisture in the spring and early summer assured an abundance of feed, and stock went into the winter in fine condition, and with a hay crop on hand unequaled in any previous year. The outlook seems most flattering.

Among the stock brought into the state, there was noticeable an unusual amount of fine breeding stock, and the quality of Montana live stock is showing a consequent improvement. There is a disposition on the part of all stockmen, both great and small, to secure the best breeding stock to be had, and the average grade of cattle is certainly improving steadily. No accurate estimate can be placed on the calf crop, but there is every indication of a considerable shortage.

The inspectors have been very successful in their operations the past year, as the table of statistics hereinafter incorporated will demonstrate. These reports

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show a total of seventy-two arrests made during the year by our inspectors, nearly all of which were for direct violation of the stock laws. Of this number we secured thirty-seven convictions and have three cases still pending. The inspectors do not confine their attention merely to the stock laws, but wherever possible they render aid to the regular officials in the enforcement of the general criminal laws. Our present force has become very efficient, most of them having been engaged in this work in the employ of this board for several years.

Among the duties of inspectors is the inspection of hides of cattle killed on the railroads of the state, and the past year's reports show a total of seven hundred and fifty head of cattle so killed and reported, the hides of which were passed upon by our inspectors, and notice of inspection sent the respective owners, enabling them to recover the value of their stock from the railroad companies. The aggregate value of such stock so reported was $25,000 for the year—a schedule of prices having been arranged to the mutual satisfaction of the stockmen and the railway companies, whereby claims are settled promptly. Inasmuch as the railways are fencing the more exposed points along their lines, the number of cattle so killed is on the decrease.

The branch of the inspection system which shows the greatest results and which is of greatest importance to minor stockmen, is the inspection of cattle shipments at the markets. Our inspectors at these points are the most efficient that we can find, and when the fact is considered that the great bulk of the shipments are crowded into about three months of the year, and the immense amount of business that is transacted on account of these shipments, it must be admited that the inspectors' work is highly satisfactory. The purpose of the system is that every animal shall be inspected, consequently the work must be thorough, and as every facility is afforded for careful and expert examinatoin of brands, errors are infrequent and complaints correspondingly few. This inspection absolutely prevents the stealing of stock for shipment from the state, and the smallest stockman receives equal protection with the large range owner, although this fact is not generally appreciated, especially by small owners. Proceeds of unknown strays are sent to the Montana Stock Growers' association, where by means of the record of marks and brands, the owners are located and their money remitted them; in case brands are on record, no difficulty is experienced in this respect, but it is not always easy to locate owners of stock bearing unrecorded brands, but as stockmen generally are securing recorded brands, this trouble is fast being overcome.

During the season just closed, the inspectors report 172,225 head of cattle from Montana shipped to various markets, and estimating home consumption at the usual figure of 60,000, the total output was 232,225 head. The most accurate estimate we can place as to the average price is $39, about five per cent increase over 1897 or any previous year. This was occasioned not alone by a little higher price, but also from the fact that breeding stock of all kinds was retained and the proportion of steer cattle shipped was necessarily greater, thus raising the average slightly in weight and price. The market was unusually steady, being marked by fewer extremes than in former years. At the various inspection points the total number of strays recovered was 16,058, of a market value of $626,000. Of this number 5,708 were paid to the owners through the Montana Stock Growers' association, the total net proceeds being $222,344.56. The volume of this business exceeds that of any previous year excepting 1897.

We append hereto a statement of the inspection work of the board since its organization.

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Year.	Cattle Inspected.	Strays Recovered	Amt. received for strays by Association.	No. of Arrests.	No. of Inspectors.
1885	79,089	$ 1,035	$ 1,119	19	8
1886	119,620	1,730	9,600	43	9
1887	82,134	3,160	15,825	13	8
1888	167,602	3,790	39,337	6	5
1889	123,880	3,424	38,411	20	5
1890	174,035	3,991	29,029	21	9
1891	250,000	13,746	181,832	14	10
1892	203,000	11,110	214,648	7	13
1893	279,158	17,565	148,776	13	14
1894	302,655	19,855	150,900	23	12
1895	306,460	24,245	179,721	29	16
1896	254,864	20,275	163,292	52	16
1897	252,162	19,104	225,373	81	15
1898	232,225	16,058	222,096	72	15

An effort was made by this bureau to collect reliable data relative to the losses caused by winter exposure, wild animals, poison and black-leg, but the returns were not sufficiently elaborate or universal to warrant a detailed or accurate report. The greatest loss was shown through winter perishing, the aggregate being apparently large, but the per cent of horses, cattle and sheep that winter on the range that perished from this cause is almost inconsiderable. Stockmen still report considerable losses from wolves and coyotes, and in some instances the individual losses were large, but in these cases they occurred through the carelessness of herders. Opinion is divided on the advisability of continuing the bounty on wolves and coyotes, but the majority of those who reported their position on the question favored a continuance. The replies received as to losses from black-leg show that in the aggregate they have been considerable, though the infection has appeared in but few places in the state. A considerable loss is also reported from poison, larkspur, aconite, loco and wild parsnip being named as the poisonous plants, while others confess entire ignorance of the cause of deaths that appear to be from poison. In the reports received from others, there appears a doubt as to poison, the inference being that the fatalities that are commonly ascribed to poisonous weeds are in fact the effect of over-eating dry foods, or are the result of turning hungry stock into abundant green pasture.

The Mineral, Mines and Mining.

While Montana is great in many other ways, having been endowed by nature with a multiplicity of resources, it is now and must for all time be greatest in its minerals, mines and mineral reduction, and when the greatness of the state is spoken of from this standpoint, the copper mines and the reduction and refining works of the Anaconda Copper company must be produced in illustration. The report of the company for 1898 gives the gross income of the concern at $18,817,957, and after deducting nearly a million dollars for the installment of new machinery and construction, the customary 10 per cent dividend was declared and a large sum was added to the reserve. The report is interesting in that it gives an insight to the cost of operating such an institution, and it also shows what magnificent opportunities the state offers in this line, as there are many unappropriated copper propositions waiting for capital and enterprise to make them yield their wealth. The report of the Anaconda Company is as follows:

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The sales of products for the three years have been as follows:

	1895-96		1896-97		1897-98	
	Quantity.	Price.	Quantity.	Price.	Quantity.	Price.
Copper, lbs	85,476,795	10.03c	120,864,097	10 70c	135,002,147	10.82c
Silver, oz	4,498,560	67.91c	6,057,067	64.08c	5,706,377	56.73c
Gold, oz	14,384	$20.62	18,571	$20.65	19,930	$20.67

This statement, which shows the quantities sold, and is therefore the measure of the receipts, does not give the production, as sales included a considerable quantity of metals carried over from the preceding year. The actual production from 1,459,249 tons of ore raised and worked was 124,417,471 pounds fine copper; 5,074,036 ounces silver and 16,610 ounces gold. The output was therefore equivalent to 4.26 per cent copper; 3.48 ounces silver and 0.01 ounces gold to the ton.

The income account, condensed, is as follows:

Sales of product, as above		$18,254,849
Profits of subsidiary departments		483,723
Royalties, rents and dividends received		79,285
Total		$18,817,957
Mining expenses	$5,745,784	
Reduction works	6,249,939	
Freights, railroads and ocean	696,298	
Refining charges at seaboard	968,891	
Interest on advances	34,900	
General expenses, New York	102,638	
Decrease in metals on hand	1,468,161	
		$15,266,611
Balance, profit for the year		$3,551,346
Dividends paid, 10 per cent on stock		3,000,000
Surplus for the year		$ 551,346
Add surplus July 1, 1897		5,644,563
Balance, June 30, 1898		$6,195,909

The items of sales of products were: Copper, $14,605,589; silver, $3,237,278; gold, $411,983: totals, $18,254,849. The value of metals on hand and in course of treatment on June 30, 1897, was $5,521,031; on June 30, 1898, it was $4,052,870; a decrease of $1,468,161, as above. The total quantity of ore treated since the first opening of the mines in 1880 has been 9,614,263 tons. The total product has been 550,962 short tons copper, 40,658,103 ounces silver and 135,244 ounces gold. The average yield has been therefore, 5.73 per cent copper, 4.23 ounces silver and 0.14 ounces gold to the ton.

The report gives the details of mining expenditures for the year as below:

	Syndicate Group.	Anaconda Group.	Total.	Per ton Cts.
Assay expenses and salaries	$4,881	$4,435	$9,316	60.6
Candles	23,681	18,080	41,761	2.9
Coal	117,501	90,360	207,861	14.2
Electric light	8,321	6,595	14,916	1.0
Expenses	10,934	9,255	20,189	1.4
Freight on ore	255,946	196,135	452,081	31.0
Fuse and caps	16,942	10,062	27,004	1.8
Labor	1,825,931	1,550,571	3,376,502	231.4
Legal expenses	7,309	18,991	26,300	1.8
Mess expenses	1,687	2,436	4,123	0.3

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	Syndicate Group	Anaconda Group	Total	Per ton Cts
Oil	9,938	7,041	16,979	1.2
Personal injuries	18,856	17,558	36,414	2.5
Powder	91,359	55,937	147,296	10.1
Precipitating expenses	.....	6,110	6,110	0.4
Precipitating labor	.....	19,012	19,012	1.3
Precipitating scrap material	.....	9,020	9,020	0.6
Salaries, including management	54,108	42,172	96,280	6.6
Stable expenses	2,857	3,165	6,022	0.4
Sundry supplies	25,560	20,674	46,234	3.2
Taxes	35,490	35,490	70,980	4.9
Timber	248,133	181,754	429,886	29.5
Tools and utensils	20,503	16,924	37,427	2.6
Water	11,265	11,055	22,320	1.5
Repairs—				
Building and structures	873	1,973	2,846	0.2
Machinery and plant	177,499	203,032	308,531	26.1
Construction—				
Building and structures	34,070	51,220	85,290	5.8
Machinery and plant	55,567	97,513	153,081	10.5
	$3,059,213	$2,686,571	$5,745,784	393.8
Deduct one-half of profits of subsidiary departments			241,861	16.6
Net cost			$5,503,923	377.2

The average cost per ton of ore reported was, therefore, $3.94 actual cost, or $3.77 net cost, after deducting profits of subsidiary departments.

The following table shows the details of reduction works expenditure for the year:

Custom ores	$164,398.29	11.3
Concentrating	1,124,508.96	77.0
Smelting	2,810,268.98	192.6
Converting and casting	1,073,938.85	73.6

	Total.	Per ton. Cents.
Blast furnace	390,106.96	26.4
Refining	603,123.77	41.4
Reduction of silver mud	73,467.10	5.0
Melting (construction)	10,125.76	0.7
Totals	$6,249,938.67	428.3
Deduct one-half profits of subsidiary departments	241,861.62	16.6
Net cost	$6,008,077.05	411.7

The total cost of mining and treatment was therefore $7.89 per ton of ore. The average yield was $11.22 per ton, showing a profit of $3.33.

The report of Superintendent Marcus Daly says:

"During the year there was shipped to the reduction works at Anaconda 1,441,538 tons (of 2,000 pounds) of ore, of which 628,051 tons came from the Anaconda group of mines, and 813,487 tons from the Syndicate group of mines, being an increased proportion from the Syndicate group, and an increase in the total over last year of 33,169 tons. A large amount of dead work has been done. Sinking of the shaft

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is being pushed and will be continued during the current year. No results will be obtained from the sinking of the shafts until the cross-cutting to the ledge has been completed, which will be nearly a year. In my opinion the visible ore reserves are equal to what was in sight a year ago. A large amount of new machinery has been put in place and in operation the past year to meet the requirements. The expenditures for this machinery and for other construction work at the mines for the year amounted to $148,733 for the Anaconda group, and $89,638 for the Syndicate group, a total of $238,371. All the machinery erected in the past year, as well as dead work and exploration work, has been charged to operating expenses. For the current year a large expenditure will be necessary for machinery, owing to the deeper workings. What this expenditure will be is impossible to estimate or approximate closely, as it depends largely upon the quantity of water we have to contend with at greater depth.

"There was received at the reduction works 1,459,249 short tons of ore, of which 17,711 tons was purchased, the remainder coming from the mines of the company. There was shipped from Anaconda 124,417,471 pounds of copper, of which 64,109,486 pounds was in the form of converted bars, and 60,307,985 pounds was the product of the Anaconda electrolytic refinery. There was also shipped 5,074,036 ounces of silver, and 16,610 ounces of gold, contained in either converter bars or bullion.

"The flume from the dam on Warm Springs creek to the upper works concentrator has been entirely replaced by one of greater capacity, the new flume being 4x8, with a total length of 10,500 feet. This flume was entirely completed and in use before the close of the year and cost $96,892; this construction was difficult and expensive, several tunnels being required; new machinery was added, costing $36,532.

"The calcining department of the smelters has been considerably crowded in the past year, and it was found necessary to add to its capacity. The casting department at the upper works having been superseded by our new furnaces for casting anodes at the converter, we have remodeled the building and installed four Holthoff-Wethey calcining furnaces, 12x100 feet, costing $122,620. These furnaces have now been in operation a few months and have greatly relieved the crowded condition of that department. Two new reverberatory matte furnaces have also been erected in this building at a cost of $30,417; other new machinery at a cost of $15,739. It also became necessary to increase the capacity of the converter plant, and the following construction work has been done there in the past year. Extension of converter building 42x103 feet; three new converter stands and nine converters; extension of boiler house 52x60 feet; one new electric crane; one blowing engine, cylinders, 24x48x48 inches; one new blast furnace; three tilting furnaces for casting anodes; four tubular boilers, 56 inches by 16 feet; two Chile mills for grinding converter linings; at a total cost of $102,775. The converter now has 15 stands and a capacity for an output of 14,000,000 pounds pig copper per month.

"A good deal of improvement work and some additions and extensions have been made at the refinery. The boiler house has been extended 60x105 feet and four sets (two a set) of elephant boilers added. The regenerating plant for purifying solution having proved very satisfactory, it was extended and the capacity increased sufficiently to handle all the solution from the refinery. The cost of these extensions was $159,611. The product has been of a uniformly high grade, more than 99.9 per cent of it being above the requirements and tests for the highest grade of copper.

"The operations at the subsidiary departments resulted in a profit of $483,723 for the year. This profit has been applied to the reduction of the costs of working expenses at the mines and works as heretofore. The decrease in the profits of these departments from last year is due to the lower charges made for coal, timber and other supplies furnished the mines and reduction works, the final economic result to the company being the same. The coal department alone shows a large decrease

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owing to the price of coal being reduced 25 cents per ton, and also to a fire destroying bunkers and washing plant, this loss being charged to operations. The foundry department would have shown a very handsome increase had not the price of castings been reduced 1-4 and 3-4 cents per pound. The only large expenditure for new plant has been for a new reservoir for the water works at Anaconda, that account now standing on the books at $299,327, as against $117,273 on June 30, 1897. The subsidiary department will require very little, if any, expenditure of capital inventment during the current year.

"For construction and new permanent improvements there has been expended on the mines and reduction works $802,957 during the year, which has been charged to operation. The principal items were: The new flume; addition to calcining and matting plant at upper works; additions and improvements at refinery and regenerating plant; tilting furnaces and converter to replace the casting department, and the necessary additions to the equipments at the mines owing to the more extended workings.

"The product of the Anaconda mine shows a considerable decrease from last year, owing to a large portion of the mine having been closed for several months on account of the fire. This has prevented the extraction of ore, and has reduced the grade as well as the quantity of what was shipped, as the closed portion of the mine contains a higher grade of ore than the open portion. The fire was not of great extent, and the greatest difficulty was in the gases thrown off. This fire had been smoldering for years, and we supposed it was extinguished, took out the bulkheads and opened up that portion of the mine with the view of taking ores from the stopes. When the air penetrated the fire district, little patches that were still smoldering broke out afresh and threw off so much gas that the men were driven from the workings and we were obliged to replace the bulkheads. Water was purchased from the city water works, and with all the available mine water was entirely extinguished. We increased our pumping machinery to handle the increased volume of water, but were unable to keep the lower levels from flooding. The work of reopening this portion of the mine has commenced and the water has been lowered. The drifts have been filled with debris from the effects of the flooding, and a good deal of work will be necessary to clean the mine up and put it in condition to produce the maximum quantity of ore. However, I expect to get this done in from 60 to 90 days.

"At the Never Sweat we are now completing the erection of a compound Ingersoll compressor, steam cylinders 30 inch and 56 inch and air cylinders 30 1-4x60 inches. A duplicate of this compressor has been ordered and should be on the ground within 60 days from this date. The foundation for this compressor is now being built. Six 250 horse-power boilers have been ordered to operate in conjunction with the five 250 horse-power boilers now in service. Three compressors and boilers are being installed to furnish air for the underground hoisting and pumping machinery instead of using steam. The water passing through the fire district, striking the hot ground, has been heated to such an extent that the pumping and hoisting stations are unendurable. The heating of this water has been intensified by the exhaust steam from the pumps and engines to such a degree that it destroys all metallic substances it comes in contact with. We hope this difficulty is now overcome, the fire being out, as far as we can see, and arrangements made to substitute compressed air for steam power underground.

"At the Anaconda shaft we are now using a temporary hoisting engine until we can get the new 30x72 inch hoisting engine installed, which will be completed in about 60 days. This temporary engine is used for the purpose of letting the men up and down the shaft, lowering timbers and work of that kind. We are not in a position to hoist any ore with this engine, and this greatly reduces the output, as a

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larger quantity of ore is usually hoisted through this shaft than any of the others. At this shaft we are also building a steel and brick fireproof engine room; also a new steel head frame.

"At the St. Lawrence shaft we have been unable to do anything but handle water, both by bailing and pumping, on account of the increased quantity coming in. This increased quantity was due to the water purchased from the city, which was turned into the burned district. The water coming in contact with the heated ground created a steam which did more to extinguish the fire than the water itself. Our facilities for handling the water were entirely inadequate, and arrangements have been made for eight heavy pumps to be distributed on the several levels, which, with those we have, will keep the mine free from water, as we now have to handle only the quantity that comes from the mine itself.

"The Butte, Anaconda & Pacific railway earnings for the year 1897-98 showed a cash surplus on hand of $144,752. Nearly all the freight business of the railway consists of ore, coal and coke hauled to Anaconda. For the year the cost per ton was 14.6 cents for an average haul of 24 1-2 miles, a decrease of 1 cent per ton compared with last year. The charge for hauling ore, coal and coke has been reduced from 35 cents to 30 cents per ton."

The Butte, Anaconda & Pacific railroad, owned by the company, carried 2,482,604 tons of freight during the year, equal to 60,985,027 ton-miles. The average receipt per ton mile was 1.423 cents; cost, 0.595 cents. The total revenue train mileage was 126,395 miles. The earnings were $6.87 and the cost $2.87 per train-mile. The total earnings of the road were $937,544, of which freight furnished $867,833. Working expenses were $448,059; interest, $71,222; leaving a net balance of $418,263 for the year.

The report of President J. B. Haggin says:

"During the year $802,957 for new construction and machinery was charged in operating costs, which, in the judgment of the trustees, is an ample allowance for any depreciation of the plant.

"The profit and loss account for the year shows a credit balance of $3,551,346. Aside from an increase of $182,055 in the capital cost of water supply in the city of Anaconda for new reservoir, etc., etc., the only charge to capital has been $1,508 for net purchases of mining claims. The diminished profit for the present year compared with 1896-97 has chiefly resulted from the following causes: A larger expenditure for new plant at the reduction works, considerably diminished price for silver, with only a slight increase in the price of copper, and increased expense per pound of copper produced. A fire during the year destroyed the bunkers and washing apparatus at our coal mines, involving a loss of $103,497, which was charged to operation. Much extra expense was incurred in mining the Anaconda lode by sinking of the various shafts and on account of the breaking out again of the old fire, which had been smoldering for over eight years, but our superintendent now hopes he has at last extinguished this fire (which has been since the beginning an almost constant worry and expense.)

"The profit and loss account of the company for the three years since its organization shows a profit of $12,945,909. The dividends in this period have been $6,750,000, about $1,000,000 of this surplus has been devoted to an increase of capital, and the remainder of $5,200,000 is represented by working capital in the shape of stocks of copper, silver and gold, stores and supplies and cash assets. It will be remembered that when the company took over the property on July 1, 1895, no working capital was provided."

The fact that Montana has the largest copper properties and reduction plants in the country, is not an indication that the state does not afford many other opportunities in the copper line that are as good or better than any of the well known mines that in the past few years have turned out millions of wealth and created many million-

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aires, as the copper districts of the state are simply in their initial stage of development and some well defined districts in which experts have the greatest faith, have scarcely been prospected. There are districts in the state where with but the slightest development large bodies of copper ore, giving high assays, have been exposed, and these only await the investment of capital and the application of labor to make them yield their owners millions of dollars of profit. The undeveloped copper mines of the state offer the most tempting inducements to capital that has an eye to the large profits that accrue to the mining and refining of copper.

The Mineral Product.

Of all the reports, the one that best demonstrates the illimitable natural wealth of Montana is that of the assayer in charge of the government assay office at Helena, Mr. Eugene B. Braden, which shows the enormous aggregate of precious metals for the past 36 years to have been $750,000,000, and that there was an increase of product for 1897 over 1896 of $3,000,000. The report is replete with authentic information of the mineral resources of the state and is given in full. It will be found of interest to every reader and is of immeasurable value to the state. Mr. Braden says:

The precious metal output of Montana during 1897 was the largest in the history of the state and aggregated $53,954,675.03. This is $3,222,576.90 more than that of the preceding year. The total production was contained in the four metals, gold, silver, copper and lead. The quantities and values of each are shown for these two years in the table below.

	1896		1897	
Metals.	Quantity.	Value.	Quantity.	Value.
Gold, fine ounces	211,914.961	$4,380,671.00	217,514.846	$4,496,430.92
Silver, fine ounces ..	15,720,022.44	*20,324,877.49	16,307,346.00	*21,730,710.03
Copper, fine pounds.	232,096,483	25,356,540.77	237,158,540	26,798,915.02
Lead, fine pounds....	22,521,340	670,009.87	25,794,974	928,619.06
Totals		$50,732,099.13		$53,954,675.03

*Coinage value.

The mountains and streams of Montana have yielded $750,000,000 of precious metals to the wealth of the world since the advent of those pioneers whose arrival was almost coincident with the discovery of gold in 1862. The figures of this output as given in the following table are believed to be the most reliable that may be obtained at this date, since no reliable compilations were attempted prior to 1882.

PRODUCTION OF GOLD, SILVER, COPPER AND LEAD IN THE STATE OF MONTANA FROM THE YEAR 1862 TO 1897 (INCLUSIVE).

Years.	Gold.	Silver**	Copper.	Lead.	Totals.	Yearly Inc.%
1862 to 1881 (inc)	$200,000,000	$11,000,000	.....	.....	$211,000,000	
1882	2,550,000	4,370,000	1,539,860	.....	8,459,860	
1883	1,800,000	6,000,000	3,452,960	226,424	11,479,384	37½
1884	2,170,000	7,000,000	5,386,500	246,326	14,802,826	31
1885	3,400,000	11,500,000	6,779,800	274,350	21,954,150	50
1886	4,422,000	13,849,000	5,761,200	494,132	24,526,332	12
1887	5,978,536	17,817,548	8,853,750	607,662	33,257,496	35½
1888	4,200,253	15,790,736	15,103,946	569,160	35,664,095	7½

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Production of Gold, Silver, Copper and Lead—Continued.

Years	Gold	Silver**	Copper	Lead	Totals	Yearly Inc. p ct
1889	3,500,000	19,393,939	13,334,970	456,975	36,685,884	3
1890	3,300,000	20,363,636	16,656,437	675,392	40,995,465	11½
1891	2,890,000	20,139,394	14,377,336	1,229,027	38,635,757	*5½
1892	2,891,386	22,432,323	19,105,464	99,035	45,419,208	18
1893	3,576,000	21,858,780	16,630,958	964,089	43,029,827	5
1894	3,651,410	16,575,458	17,233,718	730,551	38,191,137	*11
1895	4,327,040	22,886,992	21,114,869	754,360	49,083,261	28½
1896	4,380,671	20,324,877	25,356,541	670,010	50,732,099	3½
1897	4,496,431	21,730,710	26,798,915	928,619	53,954,675	6
Totals . . .	$257,533,727	$273,033,393	$217,487,224	$9,817,112	$757,871,456	

**Coinage value.

*Decrease.

This table reveals a steady improvement of the mining industry in Montana. The fact that the increase of $3,000,000 last year has been frequently duplicated, and even doubled during some of the past years, is an absolute guarantee of permanence and future growth. This table also ought to prove of great encouragement to those who have invested large amounts of capital in the mines of the state, as well as afford an incentive to those whose money must further improve the mineral resources and continue operations of increasing magnitude and importance.

The attention of the reader is directed to the statistical tables which follow this review and relate to the production of precious metals in Montana during the year. These show the origin, method of treatment and the final disposition in amounts and values of the gold, silver, copper and lead. They have been assembled from the records of the government assay offices and mints and from confidential replies made by individuals, mining companies, smelters and refineries to interrogatories and letters, aided by personal investigation and travel. Every care has been exercised to avoid duplications and the results are reliable and accurate.

The changes made in the geography of the state by the legislature which convened in January, 1897, affected the production of several counties. Broadwater county was created from adjoining portions of Jefferson and Meagher counties. Additional areas were also segregated from Meagher county to be annexed to Lewis and Clarke and Cascade counties. Thus what of late years had been the metal producing districts were taken from Meagher county. However, this county has not lost its prestige as a mining region. The recently constructed Montana railroad, connecting the lead carbonate camp of Castle in Meagher county with the Northern Pacific railroad, was put into operation during the year and encouraged that district to a new activity. Meagher county, therefore, became the largest lead producing county in the state.

The pursuit for gold has ever been attractive. Although pioneer and "tenderfoot" alike have loved to live this life of allurement and uncertainty, the prospector for precious metals in Montana has now the same chance to "strike it rich" or "make a stake" as was ever held out here or elsewhere. But little of the hidden wealth stored up ages ago in these mountains has been discovered, and this work, which is the forerunner of and goes hand in hand with the increased production of precious metals and the development of the mining industry in every region, was actively prosecuted in the older and most accessible districts of Montana during 1897. While generally unknown, it is nevertheless a fact, that Montana has been prospected only in a superficial way. Whole districts, aggregating an enormous

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area and filled with the greatest possibilities, have been unvisited by those of practical knowledge in quest of the hidden mineral deposits. It is no exaggeration to say that if the practiced eye, aided by a knowledge of metalliferous formations, searches among the mountains for a day, it is certain to find locations that will justify work and exploration. This is as true of the old districts as it is of those but seldom visited. Discoveries of gold, silver, copper and lead have of late years been made within and immediately adjacent to the limits of the city of Helena. The same is true of Butte and the older mining regions. The recent discovery of the many rich silver deposits at Lump Gulch, within an hour's journey of Helena, and of the "Mayflower," within sight of the town of Whitehall, are examples of recent profitable prospecting in districts long worked. Great possibilities must await discovery in those less frequently visited and still less intelligently prospected regions of the state.

The large mining enterprises have been developed from prospects under a wise direction of capital and a judicious management. Capital has never been wanting with which to undertake development after a practical investigation has proven the worth of any prospect. As the surface of Montana has "been but scratched over" it is believed the present number of successful mining enterprises is insignificant to what a future generation may behold. Of the "prospects" that came into prominence as producers in 1897, the Ruby mine, near Bernice, the Gold Coin mine, near Cable, the Stray Horse mine, at Winston, the Kennett and Monitor mines, near Virginia City, the Nancy Hanks mine, at Garnet, and the Keystone, Goldflint and Snowshoe mines, in Flathead county, are among the most notable. Their development and sale afforded profitable returns to their discoverers and owners. Added to the proceeds derived from hundreds of transfers of less important prospects made during the year, these amounts aggregated hundreds of thousands of dollars and handsomely rewarded the labors of this prospecting class. The outlook for future return to these is more favorable now than in the past because capital is looking for safe investment in these lines more than ever before.

Until recently the prospector has held exaggerated ideas of the worth of undeveloped discoveries. This has been a drawback to an increase in the number of producing properties. The present tendency is to reasonable dealing and the period is past when prospects of undemonstrated worth will command wildly speculative prices. This willingness to deal equitably will encourage capital to undertake exploration and purchase, and ultimately increase the production of precious metals.

The increase in the gold production of 1897 cannot be credited to any one locality but was made up by general activity in all of the mining districts. These districts are included in that area of the state comprising the middle and western sections, although it is in the one-third of the state directly tributary to the mountain ranges that the principal gulches and lode claims are located. The prominent producers of gold during 1897 were the Drum Lummon, Bald Butte, Gilt Edge, Royal, Snowshoe, Ruby, Revenue, Nancy Hanks, Mayflower, Monitor, Clipper, Leiter, Gold Coin, East Pacific, H. & H., Stray Horse and Western Mine Enterprise mines; the placers in Beaverhead, Madison, Granite, Broadwater and Missoula counties and the copper mines in Silver Bow county, the ores from which carry gold and silver as a by-product. The mines and placers above referred to, as well as others of less importance, are further discussed in a review of the industry under the county where each is located.

The increase of $3,000,000 last year was a matter of congratulation to those interested, yet it does not direct the attention merited to an activity which cannot be represented by figures. Those forces usually recognized as of local interest are so universal that they become of prime importance when considered in their bearing on the present and future production of the state. Among these are the new cyanide

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and stamp mills, hoists and tramways under construction and the machinery being installed in all parts of the state. The enlarged capacity and adaptation of the East Helena smelting plant to employ electric power after the completion of the Missouri river dam at Canyon Ferry will attract a greater tonnage of smelting product by a reduced expense for treatment. Besides the improvement promised at East Helena consequent upon the new Missouri river dam, the Peck concentrator now under construction near Helena, it is claimed will afford a method of treating low grade ores at a minimum of cost. The recently completed smelter of the Parrot company on the Jefferson river, in Madison county, with its improved facilities of treating the copper ores from the Butte district, as well as all kind of ores, and the building of the Northern Pacific from Whitehall into the Jefferson and Ruby valleys, will cause production to be undertaken at many of the low grade ore bodies now unworked in that section. The success of the gold dredging plants has widely directed attention to this method of working auriferous gravel. Lawsuits of long standing over mining property have been settled amicably and prospective suits compromised to permit the exploration and working of claims. An important addition to the Boston & Montana smelter at Great Falls has been decided upon. Capitalists will build a dam over the Big Hole river to supply electric power to Butte mines and industries, and the opening of the Blackfeet reservation to settlement will add a valuable mineral region to those now worked in the state, while the adaptation of the cyanide, bromine, chlorine and other processes to the low grade ores of the state is among the considerations of the future. By consolidation and reincorporation of companies and their interests the resumption of idle properties is to be undertaken. These features, viewed in connection with the development of ore bodies recently discovered, warrants the statement that there has never before been greater promise for mining in Montana than at present.

In Montana, gold is obtained either from auriferous gravels of placer mines or from veins or lodes and by one of the following methods:

(a) By smelting ore from the veins or lodes.

(b) By milling, amalgamation and concentration, together with cyaniding of quartz ores.

(c) By placer, hydraulic mining or dredging of gravels.

The smelting products from lodes and veins comprised those generally classed as copper, lead and dry ores. The gold derived from this source was 107,967.374 fine ounces, or $2,231,883.72, equivalent to 49.64 per cent of the entire gold yield of the state. The gain for 1897 in this class of ore amounted to 11,146.958 fine ounces, or $230,428.11.

During 1897 there was a decrease of 6,695.044 fine ounces, or $138,398.44 in the production of mill bullion over that of the previous year. The proportion obtained by mills to the total yield of gold in the state was 35 per cent. This decrease has a partial explanation in the fact that the mills of the Montana Mining company, limited (Drum Lummon mine), at Marysville, were idle until May 1, pending exploration of ore bodies in the mine. As the figures include the product from cyanide plants, there was still a small decrease beyond that explained in the shutting down of the Montana company's mills. The output by this company from their cyanide plant during the latter part of the season in a measure also affects the decreased output from their gold mills.

The extraction of refractory gold and silver values from tailings and ores by the "cyanide process" was undertaken in Montana last year on a large scale. As the cost is small it will be adopted widely among many properties in which the ores have not been susceptible of treatment by the former and more expensive methods. A general introduction of this process will acquaint men with its methods and largely increase the production of precious metals. The amounts recovered from tailings and

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ores by cyanide during the year were 9,993.117 fine ounces of gold and 33,937.50 fine ounces of silver, valued at $206,576.06 and $43,878.79 (coinage value) respectively. In this process cyanide of potassium is employed in dilute solution as a solvent for the gold and silver contained in the material under treatment. The values are then precipitated preparatory to refining. The companies employing the process, or a modification of it, were the Montana Mining company, limited, whose plant was erected near Marysville during the past year and is one of the largest of its kind in the United States, and was designed to reclaim the values contained in the tailings which had been caught during the past 14 years in large settling dams along Silver Creek; the Revenue Gold Mining company, on Richmond Flat, in Madison county, and the Gilt Edge Mining company, in Fergus county, in the treatment of the ores of their respective mines, and by Morris & Field to supplement amalgamation in the Clipper mill at Pony, Madison county.

The output of gold from placers during 1897 was 33,418.933 fine ounces, or $690,830.43. The increase over 1896 was a small one. The year 1896 had been a favorable one for placer mining, but the miners report 1897 to have been a "short season for water." This was due to the quick and early melting of the mountain snows, and to a scarcity of spring rains. It was expected, therefore, that the figures for 1897 would show a decreased output from the placers as compared with those of the previous year. However, the introduction and successful operation of machines, or dredges, effected an increase and inaugurated a new era in the history of Montana placer mining. The results achieved by these dredges during the year merit more than a passing notice, as they promise to materially increase the output of placer gold in the near future. They are, therefore, fully described elsewhere, in an article entitled "Montana Methods."

Since Marshall's discovery of gold in 1848, the profitable working of auriferous gravel has been accomplished only under the most favorable conditions, principal among which have been water and a fall in the ground attacked to permit of the disposal of the debris after sluicing. The ground included in river beds and streams, in numerous gulches where sufficient water was not available, and in large and comparatively level areas in valleys and gulches, comprise a large proportion of the auriferous deposits and have baffled all past attempts to work profitably. Many of these gravels have been thoroughly prospected and are known to contain gold in paying quantities. It is to these conditions that miner, inventor and investor of late years have turned their attention in hope of finding some method to recover this gold. The present dredges have been the outcome, and while they may not be adapted to all conditions it is believed that they may be modified to meet many of the requirements now existing. These machines handle the gravel preparatory to a washing in sluice boxes with a minimum of water. They are of two types and are designated as floating and traction. These dredges have been successfully operated in Beaverhead, Deer Lodge and Madison counties.

The increase of more than a million ounces in the output of silver is wholly attributable to copper mining in Silver Bow county, where about two-thirds of the entire yield of silver occurs as a by-product. By this term is meant that the metal is not present in sufficient quantities to make mining and reduction profitable, were it the sole product. The silver, as well as the gold by-product, is of great value and is an appreciable gain in the marketable output from these mines. The increased production of these copper ores during the year, some of which carried higher values in silver to the ton, explains this increase.

Silver mining as an industry in Montana continues to decrease in importance. With the exception of the silver properties at Elkhorn, Castle and Neihart, and the Hope mine at Philipsburg, all of the famous silver producing mines of former years are idle. However, negotiations are reported between the companies interested look-

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ing to the consolidation of the Granite Mountain and the Bi-Metallic mines at Philipsburg into one corporation. Owing to the low price of silver the operation of these properties under separate managements has been found unprofitable. The object, therefore, will be to minimize the cost of separate management, office hire and superintendence, as well as milling and mining, by consolidation into one company, and thus enable a profit to be realized. If effected, this will add materially to the future yield of silver, as the ore bodies are extensive and the past production of this metal has been enormous. The resumption of these mines will be watched with eagerness by the owners of silver properties, and ,if profitable, may encourage consolidation and economical management in other instances that will be beneficial to the industry.

Montana produced 237,158,540 fine pounds of copper in 1897, which is equivalent to 50.22 per cent of the entire output of 472,225,600 fine pounds by the United States last year. Copper mining is, therefore, the most important branch of the precious metal production in Montana. Almost the entire product is from the Butte district, which has produced $383,086,779.07 in gold, silver, copper and lead during the last 15 years. This exceeds that of any other locality of a like area in the world during the same period.

While lead mining in Montana has been the least important branch in the mining industry, the increase made during 1897 is proportionally greater than that shown in any other. To appreciate this it is necessary to consider the closing down early in the year of the Iron Mountain mine in Missoula county. This property was then the largest lead producer in Montana. The improvement made in the production of Meagher, Broadwater, Flathead and Cascade counties is therefore greater than would appear in the comparison of aggregates for the entire state. The gold and silver occurring as a by-product also adds a large amount to the output of lead mines and should be considered in an estimate of the actual advance made in this branch.

Where comparisons are made with the product of a year ago in several counties in the review which follows, the reader is reminded that in many cases the increase shown is not an actual one, but due to more general information in regard to their output having been furnished by producers. This has enabled the distribution of a large proportion of the total output among the counties, and correspondingly decreased the amount shown as "dry ores," in the table of production by counties. When producers unanimously respond with this information, every county can be credited with its actual and entire production.

BEAVERHEAD COUNTY.

The variation in the yield of gold and silver by this county in 1897, as compared with the output of 1896, is shown below:

	Gold		Silver	
Year.	Fine ozs.	Value.	Fine ozs.	Value.
1896	5,928.183	$122,546.42	365,541.70	$472,619.58
1897	12,383.324	255,986.03	216,673.67	280,143.73

The increase in gold was due to a renewed working of the placers at Bannack, while the decreased silver production is wholly explained by the lessened operations of the Hecla company on account of the exhaustion of the ore bodies at their mines.

The Hecla Consolidated Mining & Smelting company owns a number of claims on Lion mountain, in which considerable development and much mining has been done. The ore extracted was supplied to their reduction works. The operations in 1897 were confined principally to the Cleve and Atlantic mines. At the former about 35 men were employed. This mine was worked through a shaft 1,425 feet deep at an angle of 20 degrees. A force of some 65 men was employed at the Atlantic. This mine is worked through a tunnel 3,200 feet long and a 1,000-foot incline. Both mines are equipped with engines and hoisting apparatus.

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The reduction works of the Hecla company are at Glendale, about nine miles east from its mines on Lion mountain. The yield of this company during 1897, which has been made public by General Manager Knippenberg in his annual report, was 405 ounces of gold, 215,431 ounces of silver, 184,836 pounds of copper and 1,990,175 pounds of lead. During these 12 months dividends aggregating $30,000 were paid from the surplus. The running expenses exceeded the earnings by $39,438.50 and represent the loss for the year. These two items of outlay have reduced the large surplus usually carried by this company so that but a small amount remains and renders the continued operation of this famous property largely problematical. The present situation is concisely set forth by Mr. Knippenberg in his report, as follows:

"I do not say that there are no more ore bodies in Lion mountain. It is my opinion that we have not reached the end. The mountain may yet contain more wealth than we have out, but the financial risk to be incurred in finding such hidden ore bodies may be greater than we are justified in assuming in our present condition. Had we a large surplus, as in former years, I should do now just as I have done under similar circumstances in years past—push on. * * * There is only one course for me to pursue. So long as we can pay expenses from monthly earnings, I am willing to push on in development and present work, but I cannot consent to incurring an indebtedness."

The life of this company furnishes an example of the success and profit which come from legitimate mining, and from which many another concern might pattern advantageously. The ore has been comparatively low grade, and carried gold, silver, copper and lead. On the capital stock of $1,500,000 dividends amounting to $2,175,000 have been paid since organization. The large force of men employed in the operation of its mines, reduction works and concentrators for more than 20 years past has been of substantial benefit to the community. Since 1881 $7,251,563 has been paid for labor alone. It thus may be seen that the total outlay for machinery, mining property, transportation, fuel, supplies and other contingent expenses, in addition to the item of labor, has reached far into the millions. The number of these properties, alike profitable to both owner and community, has been steadily growing in the state, and this fact is rapidly taking the mining industry from the field of speculation to which it has so often been referred, and places it before the world as entitled to all the confidence and co-operation given to the best business enterprises.

Too much praise cannot be bestowed in this connection upon the management that has characterized this property. It shows conclusively that where mines are handled on a business basis they can be made a success or rejected as valueless at an early stage of operation. This is gratifying in that the increasing annoyance and outlay of large sums are saved to the investor through a long period of uncertainty as to a property's merit, which in the end would result in great disaster.

The first production of gold in Montana on a large scale was in 1862 from the bars lying along Grasshopper creek, in the central portion of this county, both above and below the town of Bannack ,and amounted to not less than $600,000. This stimulated the pioneers to prospect the territory now comprised within the boundaries of Montana, and resulted in the discovery of the millions of treasure in Alder, Last Chance and Confederate gulches, and the opening of many lesser "diggings" that have since added their output to the enormous total of gold and silver.

By hydraulicing and other methods then prevailing the rich bars of Grasshopper creek and tributary gulches were exhausted and the passing of the first capital and metropolis of Montana was accomplished. Aside from the developing of the neighboring quartz leads, Bannack for many years suffered an ominous silence and oppressive sense of desolation. The low-lying level areas adjacent to and included

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in the bed of Grasshopper creek baffled the old-timers and their methods, so that they necessarily left the richest ground unworked. It was in 1895 that a new era dawned and work was resumed by means of a dredge on these abandoned portions of Grasshopper creek. The first operations were unprofitable, but by the rebuilding and additions made during the summer of 1896 a plant was finally obtained that effected a profitable recovery of gold from creek bed and low-lying gravels. This first plant was the property of the Gold Dredging company of Chicago, and was operated under the management of H. J. Reiling. Encouraged by their success, a second corporation, known as the Bannack Dredge company, was formed by members of the former company and others. This company secured ground and erected a second plant at the beginning of the 1897 season. The Chicago Mining & Development company, who had some time previous installed a suction dredge to work their ground, remodeled the same to a bucket dredge similar to that of the Gold Dredging company, and late in 1897 the Bon Accord mines, limited, an English corporation, installed a plant further improved on their ground, some three miles below Bannack. This latter dredge has not yet been in operation, as the season was closed before its installation. To these plants the increase of more than 100 per cent in the 1897 gold output of Beaverhead county is attributable. The season of 1898 will undoubtedly be characterized by greater activity and increased production.

Besides those already installed, capital is said to have been secured for the erection and maintenance of additional dredging machines near Bannack and at the placers on Horse Prairie creek, near Amesville, in this county, some 32 miles southwest from Bannack, where the Yearian Brothers profitably prosecuted placer mining some 20 years ago.

The Western Mine Enterprise company, who own a mill and quartz claims at Bannack, made considerable output during the year. Their operations have been carried on largely in connection with leasers, who have gone into the mine and gathered the small bunches of ore, as well as opened new deposits on a royalty. Owing to the economy practiced by these leasers they are able to secure good returns for their labors and largely do away with the necessary large outlay and risk to owners attendant upon the direct operation of a mine. It is a method of mining that is becoming more and more popular in Montana.

The Blue Wing Mining district, situated several miles east of Bannack, after lying dormant for some years ,took on new life during the past season and considerable prospecting for quartz lodes was done with very encouraging results. The Departure mine, a steady producer, is the leading property in this region. It is owned and operated by Lawrence A. Brown. The development is by three tunnels, aggregating 1,870 feet. Some 10 men are employed. The character of the ore is silver.

At the old camp of Argenta some activity has been shown, although the ores both here and elsewhere in Beaverhead county carry values largely in silver, and the low price of this metal for some time has precluded the working of ores that would have been profitable in former years. A concentrator and leaching mill have, however, been in operation by Townsend & Butler at this place. The placer ground above Argenta was also worked during the year.

The production in other districts of the county was small and scattering, although there is promise that the Polaris mill may resume to handle custom ores. With a low rate of treatment afforded by such a mill the small mine owners in the Lost Cloud Mining district may become producers and in the aggregate add considerable to the yield in Beaverhead county.

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BROADWATER COUNTY.

The important mining regions are those tributary to the towns of Winston, Townsend, Radersburg, Hassel and Diamond City. These districts in 1897 produced 11,344.357 fine ounces of gold, 409,567.84 fine ounces of silver and 1,848,111 pounds of lead. The total value of these products was $936,784.48.

The most extensive pursuit of mining in the county at present is in the Crow mountains, between Winston and Hassel. Winston has been built but a few years and owes its strength to the rapid development of the mineral resources tributary to it. This district promises to become shortly one of the best known and most important mineral districts in Montana.

The East Pacific is about five miles from Winston and was the earliest producer that attracted attention to this district. It had been thought that the ore bodies in this mine were exhausted and mining was suspended. Mr. R. A. Bell, of Helena, then bought the property at a moderate price. His search for ore was successful and last year the East Pacific had grown to be the second largest producer in the state east of the main range of the Rocky Mountains. This property is giving employment to a force of 60 miners, besides teamsters and others. The product is a base ore, carrying gold, silver and lead, which is shipped to lead smelters for reduction. The two working tunnels at this mine are 1,800 feet and 2,700 feet in length, respectively.

The Stray Horse mine is another Winston producer, although it made its advent as such only a few months ago. It was purchased by the Ajax Mining company, a corporation of Helena capitalists, from the Connon Brothers, for $85,000. The company has been successful in its venture and a long period of successful mining is probable. An operating tunnel to reach the vein at a depth of 500 feet is being run, which will greatly facilitate the development and extraction of ore. The ore in the Stray Horse is characteristic of that in the Winston district and carries values in gold, silver and lead. It is reported that this company will erect a concentrator.

The Harris & Hazelton mine, generally known as the "H. & H.," is located at Winston and has been producing for a number of years. It is now owned by the Custer Mining Syndicate. Last year the mine was worked by leasers, who confined their operations to the surface deposits. These are numerous and of good paying quality. The ores are oxide and sulphide and carry gold, silver and lead. Frequent shipments were made to the leading smelting plants.

Besides these three mines, the district has many properties in different stages of development and production, which insure steady growth and progress.

Townsend, the county seat, is located at the crossing on the Northern Pacific railroad and the Missouri river. It is the gateway to the Hassel and Park districts, as well as to Meagher county, in which it was located before Broadwater county was created. Immediately opposite to the town and west of the river are the old placers along Indian creek and in the tributary gulches. These have produced largely in the past, although of late years their yield has been comparatively small. A company of Townsend and Helena men has been incorporated to operate a dredge on this creek and adjacent gulches. A scarcity of water has been the drawback to washing this gravel, which carries profitable values in gold.

The Hassel district lies eight miles southwest of Townsend, at the head of Indian creek, and the Park district is some distance beyond and farther up the mountain. Both of these have been actively prospected in the past year and promised strikes are reported. Considerable machinery has also been taken into this section. The mines have produced considerable smelting ore that was hauled to Townsend for rail shipment. The ores of the district carry silver. The low price for this metal necessitated only a small production.

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The Diamond Hill mine, now owned by Scottish capitalists, is located near Hassel. The large mill at the mine and the electric power plant and dam on Crow creek were completed during the year. The Diamond Hill mine is a large low grade proposition, mined at a small cost per ton. If the cost of milling on a large scale can be secured for a correspondingly low rate it is probable that a handsome revenue will yet be returned to the owners. The 120-stamp mill and the 48 vanners were designed to be run by electric power generated by the plant on Crow creek. A test of this plant when completed proved the power to be insufficient. As the cost of fuel would overcome the small margin in ore, steam power is unprofitable. It is said negotiations are pending to secure current from the Missouri river electric plant at Canyon Ferry as an alternative for the Crow Creek power plant. The future of the Diamond Hill is of great importance to mining in that it will determine the success of modern mechanical appliances in mining, handling and treating large quantities of low grade ores at a minimum cost and yield a reasonable return on the investment. The future of this property is watched with interest and its success widely desired.

Radersburg is one of the older towns in the state and considerable mining in both quartz and placer was formerly done here, the Blacker and Keating mines having been large producers, and both are preparing to resume operations. Near Radersburg is also located the North Home mine. This is a large deposit of "horn silver" ore (chlorite) that has been worked but little owning to the incompatibility of the owners and a weak silver market.

Diamond City is also an old town and was the early placer camp located in the famous Confederate gulch, which yielded so enormously in years gone by. Its situation is in the northwest portion of the county. Authoritative estimates place the gold taken from this gulch at $19,000,000. Placer mining is still followed in a small way by miners working along the bars, but their output is inconsiderable at present.

A large number are employed in prospecting and small mining operations in all sections of Broadwater county.

CARBON COUNTY.

Gold is found in small quantities along Clark's Fork and other streams near Red Lodge. The yield last year was 111.366 fine ounces, or $2,301.52. The western portion of the county is broken by exceedingly high mountains, from which valuable finds of mineral have been reported. A dredging plant is reported to be in process of erection on Clark's Fork, whereby greater values may be secured than heretofore.

CASCADE COUNTY.

The mineral producing district of this county is the southeastern part, which lies north and east of the Little Belt mountains and which was segregated from Meagher county a year ago. Cascade county also occupies the territory surrounding the confluence of the Missouri and Sun rivers.

The county seat is Great Falls, situated on the east side of the Missouri river, above the Great falls, from which the town takes its name. Here is located the large copper smelter and refinery of the Boston & Montana Consolidated Copper & Silver Mining company. Power is obtained from the rapids known as the Black Eagle falls. The works are very extensive and were built at this place to secure the cheap power in the treatment of ores from the company's mines at Butte. These falls, which could generate a power estimated as the largest in the United States, have already been of great benefit in the development of the state. It has been found that a sufficient saving is effected in the cost of treatment and refining to warrant the hauling of the ore between the two terminals of the Montana Central and utilize

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this water power. Trains of enormous tonnage daily arrive at the smelter from Butte. These return with coal from the mines at Belt and Sand Coulee, which are the largest coal mines in the state, and are also in Cascade county. The Montana Central, the Boston & Montana smelter and the Great falls thus constitute an interesting feature of the copper mining industry.

The precious metal production of this county originates in the mines near Neihart and Barker. The output of Cascade county was as follows: Gold, 490.046 fine ounces; silver, 385,844.69 fine ounces; lead, 1,338,836 pounds, or a total of $557,198.15.

The mining camp of Neihart showed unusual activity during 1897. Here are located the Broadwater, Diamond R., Florence, Big Seven, Queen, Benton group and Bernier & Gann mines, besides others in less advanced stages of development and production. The largest as well as the best known property at this point is the Broadwater mine, whose ores carry silver and a small percentage of lead. It is owned by John S. Searles, of New York city. The product is treated at the Silver smelter, below Great Falls, owned by the United Smelting & Refining company. This company took a lease of the Broadwater mine during the year and are operating the same. The tonnage from this property was enormous last year and its operation afforded employment to a large force.

The Florence, Big Seven, Diamond R., Benton group, Bernier & Gann and Queen mines were also active. The product from all, like that of the Broadwater, carried the principal values in silver contents. Besides this, lead is present in a small quantity, and in the case of the Big Seven the gold contained was a considerable item.

At Barker the largest yield last year came from the Wright & Edwards mine, where some 25 men were employed. The property is now leased by the United Smelting & Refining company and operated in connection with their smelter below Great Falls. Work on the tiger and other claims is being done by leasers, while considerable activity is elsewhere displayed about the district.

CHOTEAU AND TETON COUNTIES.

The output of gold from these counties originates in the placers near Gold Butte, one of the Sweet Grass hills. This district is located in the two counties near the international boundary.

DEER LODGE COUNTY.

The area embraced in this county lies about half way between the northern and southern boundaries of the state, immediately west of the main range of the Rocky mountains. The region is very rich in mineral, the output of the precious metals last year being 18,143.307 fine ounces of gold, valued at $375,055.44, and 9,111.45 fine ounces of silver, or $11,780.46. The northern portion of this county is mountainous and broken, the drainage being by the Big Blackfoot and Flathead rivers and their tributaries. This region has been but slightly prospected, although some valuable discoveries have been made. The central and southern divisions of the county at present are more accessible, and mining, smelting, agriculture, lumber and stock-growing alternate with each other in giving to this section a diversity of pursuits that guarantees large wealth and prosperity.

The leading producer in the central part of Deer Lodge county is the Bald Butte mine. It is owned and operated by the Bald Butte Mining company, and lies almost at the summit of the main range. This mine has paid dividends for six years and the exploration completed during the year assures the present yield for many years. The mine is operated through the two tunnels

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known as No. 1 and No. 2. These are 1,500 and 1,700 feet in length respectively. The ore is free milling and treated at the 60-stamp mill owned by this company, some three-quarters of a mile below the mine. All values that escape successful amalgamation on the plates are secured by a subsequent concentration of the battery pulp on Frue vanners. The tailings are then discharged into a settling dam below the mill.

The Bald Butte stamp mill is the best appointed in the state. Light, airy and clean are terms that describe one's first impression of the plant, and inspection inspires the feeling that economical operation is also achieved here in the fullest possible degree. From the delivery of the ore to the mill by wagon until it leaves as tailings, the passing of it through bin, feeder, mortar and concentrators is performed by gravity, and reduces the cost of labor for milling to a minimum. An electric plant is located at this mill which furnishes lights to the mill and mine and power to a crusher at the mine, the ore being broken before hauling to the mill.

Another property in this county near the summit of the Main range, and some 10 miles northwest of the Bald Butte, is the Prize mine, which has been purchased recently by eastern capitalists. The vein has been explored by a 500-foot shaft, and the ore is prospected in a 10-stamp mill. The owners entertain great hopes for this property. The lead is a strong, regular and well-defined fissure vein, and the product is free-milling gold ore.

The Ontario mine is a Deer Lodge county property, somewhat involved in debt by early mismanagement. For this reason little has been done recently with the property. The equipment includes a 200-ton concentrator and hoisting plant. Should the present obstacles be removed it is said that a large force could be employed in extracting ore that would prove profitable.

Washington gulch, 12 miles north of Avon, is a tributary of the Big Blackfoot. At this point W. M. Johnson & Co., a Chicago syndicate, have erected and operate a land mining machine, which they call a "traction dredge." The machine proved very successful during the last season and attracted much favorable comment because of its simplicity and strength. This machine will closely crowd the floating dredges operated along the Grasshopper creek in Beaverhead county, for general adaptability and usefulness in working gravels heretofore beyond the scope of placer mining.

The auriferous deposits of the Big Blackfoot, at Lincoln, yielded large values during the earlier years of mining in the state. Washing of placer gold is still pursued in an unimportant manner and the annual yield from this locality and from other points along the Big Blackfoot is considerable. Another important placer camp in early years, not far from Washington gulch, was at Blackfoot city. This is now called Ophir. Considerable activity is still displayed here and improvements, consisting of new flumes and ditches, have been built during the year, preparatory to enlarged operations. The yield of this gulch is closely approximated to have been $7,000,000.

On Nevada creek, near Helmville, Messrs. Raleigh and Clarke have placer ground, which is worked regularly and yields considerable gold.

Coloma is situated on Elk mountain, in the Bear Mountain range. The Granite county line is distant less than a mile to the south, and the Missoula county line is two miles westward. Large quantities of gold were taken from placer mines in this neighborhood during the palmy days. Subsequently to this, as the yield became scarcer, the miners turned their attention to prospecting for the quartz lodes that had supplied the rich deposits to the gulches, but without success until about 1885, when activity again came to Washoe and Bear gulches and a number of mining claims were secured that have since proved valuable. The Mammoth mine was the prin-

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cipal discovery and came into possession of the Mammoth Gold Mining company in 1890, who have since operated the property. The property now includes a 10-stamp and cyanide mill in Washoe gulch, where the ore is treated. Some 50 miners are regularly employed.

Promising locations in Deer Lodge county near Coloma include the I. X. L., adjoining the Mammoth, the Valley, Clementha, Rose Darling and others.

Gold was first discovered in Montana at the town of Pioneer, on Gold Creek, near the Granite county line. The placer ground at this point has been steadily worked ever since and still yields large sums. The output from this vicinity last year was over $20,000 ,and the total yield up to date has been about $4,000,000.

Cable is located in the southwestern corner of Deer Lodge county and takes its name from the Cable mine, which has passed into history as having produced the richest quartz ever mined in Montana. A famous "clean up" amounted to $75,000 after a run of 10 stamps for something over 24 hours. At the time it is said that the battery coppers became so loaded with amalgam that the stamps were choked and finally could not be dropped successfully.

The largest producing mine near Cable at present is the Gold Coin mine. The property is equipped with a 30-stamp mill. The property has the distinction of being the highest gold-fineness and purity of any taken from quartz in Montana. Although a recently opened mine, the output has grown to be considerable.

The Southern Cross mine at Cable is under lease to parties who make a specialty of treating base ores and tailings that are not susceptible of successful amalgamation and concentration. In this the cyanide process is employed in a form modified to meet the existing requirements of the ore.

The city of Anaconda is the county seat of Deer Lodge county and has a population of 12,000. It is one of the largest and most important places in the state. The copper smelting works of the Anaconda company are located here. These are the largest of the kind not only in the United States but in the world. They are 28 miles from the mines of the company at Butte. The ore is carried to the smelters by the Butte, Anaconda & Pacific railroad, a property in which the Anaconda company owns a controlling interest, the line having been built by them several years ago to transport this ore.

The plants at Anaconda consist of the Upper Works, the Lower Works, converters, electrolytic refinery, foundry and brick yards. Three thousand men are employed and the monthly pay-roll is $250,000. No expense has been spared in equipping the works throughout with the most approved machinery and methods. The smelters were founded in 1883 and represent an investment of over $10,000,000. Nearly 300 carloads of ore are handled daily. To do this hundreds of tons of coal, coke and other fuel are consumed. It is impossible to describe in detail this great plant and its vast business in the limits of this review, yet it stands as a most eloquent monument to the mining industry in this state, built as it has been in 15 years, and simply to treat the ores of a single company. No better index to the possibilities of Montana mines can be pointed to than this. It is a project well entitled to a place among the wonders of the world.

FERGUS COUNTY.

The large area lying between the Missouri and Musselshell rivers is known as Fergus county, and is devoted principally to stock raising and agriculture. In 1897 the product of gold and silver was 3,148.559 fine ounces and 237.36 fine ounces respectively, and together worth $65,393.38. The mining districts in this county are in Judith, Moccasin and Belt mountains. The former two ranges are situated near the center of the county and about 10 miles from each other. The formation is similar

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and consists of lime, granite, gneiss, porphyry, slate, quartzite and shale. The leads are contact veins. Blanket leads also exist. The principal producing properties and gulches are near the towns of Maiden and Gilt Edge.

The Spotted Horse mine at Maiden is in a lime formation and in the past has produced about $1,500,000 of gold. The career of this property has been one of ups and downs and will ever form an interesting chapter in the history of Montana mines. It is developed and worked through a double compartment shaft nearly 400 feet deep. A hoist and a stamp mill constitute the equipment. Recently the management of the property has been changed, new machinery secured and an effort is to be made to place the mine again on the list of large producers.

The Gilt Edge mine is another property that has attracted wide attention. It is about four miles east of the Spotted Horse and is worked through tunnels and cuts. A large amount of low grade ore is in sight. A mile below the mine is the cyanide mill with a daily capacity of 60 tons. Mismanagement in the past has gotten the property into financial entanglements from which it is being released as rapidly as possible. Its growth has been seriously retarded on this account. The ore is an ideal one for treatment by the cyanide process and under the management of the receiver for the property, L. S. Woodbury, large returns have been derived in the past year and the mine has proven to be a veritable bonanza. A reorganization of the company is to be effected and work resumed on an increased scale. The ore when worked in large quantities under careful management will yield a good revenue.

Other properties of this section are those of the Maginnis Mining company, and the New Year and American Flag groups. The former was a considerable producer for many years, but as the ores became base with depth the mine was finally abandoned. The latter two are under bond. The New Year group is about three miles from the Spotted Horse, while the ore is of the same character as that at the Gilt Edge and worked by the same process. These groups are promising prospects and merit the attention and development now being given to them.

Placer mining is followed in a small way among the Judith, Moccasin and Little Belt mountains. The yield of this gold in Fergus county during 1897 was about $1,000. Rubies and sapphires are found along Yogo creek, in the southwestern part of the county. The quality of the gems is excellent and as the demand for them is a growing one, the yield will achieve greater importance.

FLATHEAD COUNTY.

Lying west of the Rocky Mountains and north of Flathead Lake and the Cabinet mountains is Flathead county. To the north and west are Canada and Idaho respectively. Although the placers of Libby creek are as old as the history of mining in Montana, the development of the resources of this county cannot be said to have been undertaken until after the building of the Pacific extension of the Great Northern railroad across the county in 1891, which afforded communication and railroad facilities to this region. The growth of its mineral and other resources has since been progressive and in 1897 was as marked as that of any section of the northwest. The discoveries under exploration at present, and the mines now worked, indicate that Flathead county will achieve an importance in mining in Montana rivaled only by Silver Bow county. Enough is known to warrant the statement that gold, silver, copper and lead are all in the list of future products and in sufficient quantities to secure the needed capital for development and operation.

The Snowshoe mine is situated in the Cabinet mountains, 18 miles south of Libby. It is owned by Spokane parties. The showing made is a flattering one. Tunnels of 750 feet and 230 feet have been driven on the vein and expose a large volume of ore. The ore is an iron pyrites and galena, carrying gold, silver and

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lead, and is concentrated at the mine. The product is then shipped to a lead smelter for treatment and reduction.

The Keystone mine is on the Yahk river at Sylvanite, in the extreme northwestern portion of the county and state. It is developed by a tunnel 200 feet in length. The ore, which carries gold, silver and lead, is treated in a 10-stamp combination mill operated by water power, about one and one-half miles from the mine.

The Goldflint mine is another property at Sylvanite. A tunnel of some 400 feet has been run to develop and work the mine. Gold, silver and lead are the values recovered from the ore. A 20-stamp combination mill will soon be completed.

The Silver Cable mine is a property in the Cabinet range about 25 miles south of Libby. Considerable development work has been done here and the quartz yields values in gold, silver and lead. A three-thousand foot tramway connects the mine with a 50-ton concentrator and transports the ore for treatment. Both tramway and concentrator were built in 1897.

To the east of the Kootenai river, and immediately south of the international boundary, is the Tobacco Plains country. The Independence mine, eight miles from the river, gives promise as a copper producer. The exploration at this mine aggregates 1,000 feet and shows a strong lead of chalcopyrites of copper. The present development will justify the erection of a concentrator at the mine.

The B. & B., the Big Eight, the Juliette, the Yankee Girl and other properties are receiving attention and promise much at the present development.

GRANITE COUNTY.

Granite county lies between Deer Lodge county on the east and Ravalli county on the west. The main line of the Northern Pacific crosses the county from east to west nearly parallel with the northern boundary. A branch line also extends from Drummond to Philipsburg, the county seat. The county is exceedingly mountainous and rich in precious metals. The yield of gold and silver last year amounted to $770,924.68.

Placer mining is carried on profitably in a number of localities. The yield in 1897 was slightly in excess of $30,000.

The silver mines centered about Philipsburg have become famous for their enormous production in the past. This has amounted to many millions of fine ounces. The leading property was the Granite Mountain, which paid over $12,000,000 in Dividends, while the Bi-Metallic, Hope, Trout and many others have been worked successfully and yielded large returns to their owners. The decline of the price of silver brought about a closing down at the several mines. After having been idle some years, the Granite Mountain and the Bi-Metallic are soon to resume work. This will be a welcome feature of the coming year to all interested in mining in this section of the state. A consolidation has been effected of the companies owning these mines and mills, and under a single management it is believed that enough of a margin can be realized from working the large bodies of low grade ore in sight to yield a profit.

Some distance northwest of Philipsburg is the Combination mine. This is exclusively a silver producer and has yielded steadily for a number of years in spite of the low price of silver. The ore is of a higher grade than that from the mines nearer Philipsburg. It is to this fact that the profitable working without stopping is generally attributed, while larger properties were idle.

The camp of Garnet came into prominence during 1897 because of a number of rich discoveries. It is in the extreme northern part of the county and about 12 miles from the railroad station of Bearmouth. The veins are copper and gold

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bearing, and lie in a contact betwen the lime and granite. A great deal of work is done by leasers.

The Nancy Hanks, the largest producer in the camp since rich ore was struck last summer, has made a good record and netted a large profit to the owners. In carload lots the ore runs five ounces of gold to the ton and four per cent of copper. Other mines, among these the Shamrock, adjoining the Nancy Hanks, the International, the Red Cloud and the Tuskman, have been working successfully. As development is prosecuted the ore bodies are found to increase in size with depth, and this brightens the future of the district. As the original discovery was made only last summer, the country is but little prospected and valuable discoveries probably await those who undertake a practical search.

The Moose Lake district, lying about 30 miles southwest of Philipsburg, is another region of Granite county that sprang into prominence for the first time in 1897. The outcome from the small plants installed to test the ores is awaited with interest.

The Golden Scepter company, who operated at Quigley, has been reorganized and reincorporated as the Majestic Mining company. After a heavy investment in mine and mill by the first company the property became involved in debt and was sold at forced sale before being worked. A considerable outlay will be made by the new company to make the improvement necessary to commence work during the coming season on a large scale.

JEFFERSON COUNTY.

Jefferson county is situated near the center of the western half of Montana The region is rich in mineral and the surface is much broken by mountains. Mining is the principal industry, and the yield of precious metals by this county in 1897 was the second largest in the state. The value of the total output was $1,161,438.88. In detail the values were: Gold, $162,872.02; silver, $984,230.32; copper, $1,160, and lead, $13,176.54.

The largest producer in the county is the Elkhorn mine, at Elkhorn. Strictly speaking, this property is a silver proposition, although the ore carries both gold and lead. It is owned and operated by the New Elkhorn Mining company, under the management of Walter S. Kelley. Some two or three years ago it was given out by that company that they were about to abandon this property, and for a time development work was stopped. However, under careful supervision it is still in active operation, although the future is problematical, and it may ere long pass into history as one of the famous mines in the state at this period.

Outside of the Elkhorn, every prominent producer of past years in Jefferson county was idle in 1897. In this list may be included the Alta, Hope, Katie, Golden Sunlight group, Eva May, the silver mines at Lump Gulch, and others. The sale and reorganization contemplated of the Hope mine, the rebuilding of the concentrator and erection of a smelting plant at the Katie, are projects destined to redeem these unfortunate properties from the idleness of the past year and increase the output of this county.

The Ruby mine, at Bernice, became the property of the Gold Mountain Mining company during the year, and the heavy extraction of ore for a few months has already proven this to be a rich producer of both gold and silver. A concentrating plant has been erected and the product is sent to a smelter for final treatment.

The Overland mine and mill, near Montana City, were active during the year. The Bonanza Chief is another property in this vicinity that was worked profitably. The number of small producers in all parts of the county made up a considerable product. At Montana City a dredging machine was in operation on the placers at

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this place, but owing to an imperfect method of work the recovery was small. A new plant is to be installed in the hopes of saving the gold.

LEWIS AND CLARKE COUNTY.

Lewis and Clarke county embraces the portion of Montana that lies immediately east of the main range of the Rocky mountains. On the east is the Missouri river and on the north is the Sun river. The production of gold and silver in 1896 and 1897 was as follows:

	1896		1897	
	Fine ozs.	Value.	Fine ozs.	Value.
Gold	29,217.614	$603,981.68	31,762.517	$656,589.49
Silver	146,170.87	188,988.59	131,077.04	169,473.34
Totals		$792,970.27		$826,062.83

The increase of $33,092.56 is a very creditable one, as the mills of the Montana Mining company at Marysville were idle until May 1.

The largest property in the county is that of the Montana Mining company, limited, at Marysville. This is also the most important gold mine in the state. The development consists of about eight miles of tunnels and entrances to the various levels. A depth of 1,600 feet has been reached by the present workings. The equipment at the mine comprises a 60-stamp mill and Frue vanners, a 50-stamp mill with pans and settlers, a 100-drill air compressor and drills, three hoisting engines and hoists, pumps and machine, blacksmith and carpenter shops. The ore is free milling, and the mining, milling and development affords employment to about 250 men.

During the summer of 1897 the Montana company erected a 400-ton cyanide plant in Silver Gulch, about three miles below Marysville, to work the tailings from their mills that had been recovered in settling dams. The tailings treated in 1897 were from the lowest of the five dams in Silver gulch. This is about six miles below Marysville and about two and one-half miles below the cyanide plant. A narrow-gauge railroad was built to connect the two. These tailings are prepared uniformly for treatment at the dam by plowing, harrowing and continuous working to pulverize the slime lumps. The material is then loaded into cars of three tons capacity each and are then delivered to the mill. As this mill is the largest working by the cyanide process, a brief description follows.

The tailings after leaving the cars pass in an almost continual stream to the sheet-iron lining of the bins and out of the gates to a 24-inch four-ply belt conveyor, which conducts them to a revolving chute or distributor; and this in turn fills a vat 38 feet in diameter by nine feet deep with 400 tons of tailings in about eight hours. The great advantage of filling a tank in this way is that it gives a charge of more uniform permeability than any other method.

There are four of these tailing vats, each with its bin, conveyor and distributor, and one is charged daily, thus giving four days to complete the treatment of each charge, which consists in saturation, lixiviation, washing and discharging. The latter is accomplished by sluicing with 2 1-2 inch hose, the water being under a 60-foot head, through four side-discharge doors and one bottom-discharge gate in the center of the vat. By this method 400 tons are discharged in three hours or less at a total cost of less than two cents per ton.

The solution tanks are 10 in number and consist of four precipitating tanks of California redwood, 22 feet in diameter by 14 feet 9 inches deep, and two storage or supply tanks, 38 feet in diameter by nine feet deep. There are also two water tanks, 22 feet by 14 feet 9 inches, for the storage of 80,000 gallons of water. The

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power equipment consists of a 50-horse power boiler, one 25-horse power engine, one 10-horse power engine for running conveyors, one 30-light dynamo, one Knowles economical-geared pump having four-inch inlet and discharge, two Worthington all-iron duplex solution pumps, five-inch suction and four-inch discharge, and one two-drill air compressor.

The tailings are the lowest grade in gold of any now worked in this country and are rebellious, containing copper carbonates and sulphide tetrahedite, arsenical polybasite and ruby silver. The plant operates under very unfavorable climatic conditions, being in the most northern latitude of any known, but in October and November it exceeded the predictions of profit by nearly 50 per cent and netted about double the return the company considered would justify the erection of the plant.

The St. Louis Mining & Milling company owns the property adjoining the mines of the Montana company at Marysville. The property is a steady producer, the ore being treated in a 10-stamp mill on Trinity creek, about one and one-half miles from their mine. Mr. Thomas Cruse is also operating in the vicinity of Marysville. The North Star is being developed and adjoins the Montana company on the east. At the Bald mountain mine, on Belmont mountain, he is taking out ore and milling the same in the old Belmont mill.

Samuel Word & Sons operated the mines and 60-stamp mill belonging to them at Empire intermittently during the season. Some rich ore was uncovered which yielded a considerable revenue in milling.

The Gloster mine and 60-stamp mill at Gloster are still idle. However, a number of smaller properties are being worked in the vicinity of Marysville, and considerable values of gold and silver recovered from the low-grade free-milling ore that is characteristic of the district.

The Rimini district has a number of properties in various stages of development. Considerable attention has been attracted to what is known as the porphyry dyke, which lies north of the Josephine and Ontario mines. This is an immense body of low-grade free-milling ore, some two miles in length and several hundred feet in width. The Pauper's Dream and the Columbia Mining company are each operating small stamp mills profitably on this ore. The cost of mining the product is insignificant and large mills operating at a minimum expense should prove this to be a valuable proposition and return a fair revenue from the small margin still remaining in the ore. About four miles south of the city of Helena is Unionville district, which yielded several million dollars in gold and silver previous to 1880. The Whitlach-Union is the most celebrated of these old properties. In this district and supposedly on the same vein, are located other properties on which but little development work has been done.

Five miles west of the city of Helena is the Blue Gould mining district, where Thomas Cruse is reported to have a large property. In the vicinity of York, on Trout creek, are the Little Dandy and other mines. Most of these have been idle during the year, although negotiations are pending to enable them to be developed and worked. The properties of the Jay Gould and Tremont companies, at the head of Virginia creek, have been idle throughout the year. These were formerly celebrated camps, from which a great deal of gold has been taken.

It is from the placers that the greatest profit from mining has been realized in this county. The city of Helena is built in the famous Last Chance gulch, from which fully $33,000,000 in gold has been taken since its discovery in 1864. Immediately adjacent and south of Helena are Dry gulch and Oro Fino gulch, from both of which heavy values have been washed. Considerable gold is still secured from these localities by miners working independently. Gold is also produced from bars along the Missouri river and tributaries, especially those in that portion that was formerly

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Meagher county and lying east of the river. Other "diggings" in the county producing gold are those of Canyon creek, Virginia creek and Seven Mile.

MADISON COUNTY.

Lying between Beaverhead on the west and Gallatin on the east is the county of Madison. To the south is the state of Idaho. Important mountain ranges traverse this large area from north to south. These include the Madison, Tobacco Root, Snow Crest and Ruby ranges in the south, and the South Boulder and McCarty mountains in the north. The drainage is by the Madison, Jefferson, Beaverhead and Ruby rivers and tributaries. The territory embraced in the county is a large one, where mining is most exclusively carried on in the mountains, while in the valleys agriculture and stock raising prosper and are excelled nowhere else in the state. Although Madison county was the first to be explored, and its hills contain a wealth of gold and silver second to none, the development of its discoveries has been comparatively small. This has been brought about by the utter lack of transportation facilities, as well as smelting and other convenient means of treating the low-grade base ores. During the past year the Northern Pacific railway has undertaken the building of a branch line from Whitehall into the Jefferson and Ruby valleys, upon which work will soon be completed. This valuable facility has its complement in the new Parrot smelter, which has been built at a cost of nearly three-quarters of a million dollars, and is to commence operations in a short time at Parrot (formerly Gaylord.) This surmounting of these past wants will incite greater activity and rapidly urge Madison county on to an ever-increasing production.

Because of the large territory comprised in Madison county, and the many prospects and producing mines with which the mountains and gulches are diversified, it will be impossible to attempt more than a brief review of the many excellent properties worthy of mention that are particularly notable on account of their outputs and showing, and only a general reference can be made to the many really meritorious prospects that abound in all sections of the county.

Below is a comparison wherein are shown the outputs for the years of 1896 and 1897:

	Gold		Silver	
	Fine ozs.	Value.	Fine ozs.	Value.
1896	17,644.502	$364,744.23	39,418.58	$50,965.43
1897	32,771.644	677,450.01	62,412.33	80,694.73
Increase	15,127.142	$311,705.78	22.993.75	$29,729.30

The large increase shown does not represent the actual condition that prevailed in Madison county last year. While the production was much greater than in 1896, it was not 100 per cent greater. The increase shown is due in some measure to an almost universal response by mining men everywhere in the county to requests for information regarding their outputs. This had not been done the previous year.

Madison county is famous in that it contains Alder gulch, the greatest producer of placer gold the world has ever known. The yield of wealth by this gulch since its discovery in 1863 has been in excess of $90,000,000. The pay dirt was worked for a distance of 16 miles by drifting. Alder gulch heads up well into the mountain known as Old Baldy, and flows northwest into the Ruby river above Laurin. Virginia City, the former capital of the state, and at one time the metropolis, is situated about midway between the source and mouth of Alder gulch.

Quartz mining is at present centered about the South Boulder mountains at Richmond Flat, Norris, Pony, Parrot, Sheridan and Virginia City, and in the McCarty range at Rochester and Silver Star.

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The mines at Richmond Flat are the Revenue and the Monitor, and are about seven miles from Norris, the nearest railroad station. The former is owned and operated by the Revenue Mining company and gives employment to about 40 men. The mine is worked through a shaft to a depth of less than 200 feet, and the equipment consists of a hoisting plant. The ore is base and treated by the cyanide process in a 50-ton plant about one mile from the mine, to which it is hauled by wagons. This property is among the large producers in the county.

To the west and adjoining the Revenue is the Monitor, owned by the Monitor Gold Mining company. Employment is afforded to about 35 men. This property is worked to a depth of about 200 feet through a shaft. The product from this mine is similar to that of the Revenue, being a quartz that carries gold in base form. It occurs in shoots along the vein, which varies in width from a few inches to several feet. It carries good values and is shipped by rail to the smelters for reduction and treatment.

The Parnell mine is about three miles from Norris and belongs to the Montana Boy Consolidated Mining company. The output is a free-milling gold ore, treated in a 10-stamp mill run in connection with the mine.

The Little Kid mine is located about 17 miles from Norris and gives employment to about 15 men. The property is owned by F. W. Norenberg, and is developed and worked by tunnels to a distance of 400 feet. The character of the ore is free-milling gold, which is successfully treated in a 20-ton Bryan mill.

The principal property at Pony is known as the Clipper group and belongs to Elling & Morris. These mines are located three miles west of Pony and are developed by tunnels, the longest one being about 1,500 feet in length. A compressed air plant operates seven drills for mining purposes. The greater part of the ore is free-milling and is hauled by wagon for treatment to the 20-stamp mill located at Pony. This mill is run by water power and on account of freezing does not work in the winter. In addition to amalgamation and concentration at the mill a cyanide plant has been added which secures any values that migth otherwise escape. About 30 men are employed at the Clipper mines and mill.

The Galena mine is two and one-half miles west of Pony and belongs to the Garnet Gold Mining company. It is worked by two tunnels, each 900 feet long. Twenty-five men are employed at the mine and mill. The ore is a concentrating one carrying gold, lead and copper, and is treated in a 20-stamp mill owned by the company.

Considerable activity was shown about the Sand Creek district during the earlier part of the year. The principal producer there was the Chile mine, located about three miles south of Sappington. A five-stamp mill is at the mine, which is developed by a shaft to a depth of about 100 feet. The ore is free milling. About 15 men are given employment when the mine is running. At present the property is idle. Three miles east of the new town of Parrot is the famous Mayflower mine, that has grown to be one of the richest discoveries in the state during recent years. The Mayflower Mining company, a corporation composed of Butte capitalists, own and operate the property. Development is by tunnels. The ore is a high-grade, free-milling one, that is sent to the smelters for reduction. Owing to some controversy over the ownership of the property and adjoining claims the mine was idle a portion of the year. All differences are reported to have been settled and the future of this mine and district will be watched with a lively interest.

Hoffman & Chisholm own the Carolina mine, a property lying some distance northwest of Sheridan. This has been well developed and the ore produced is sent to the smelters for treatment. Gold is the principal value in the ore.

At Leiterville, about eight miles east of Sheridan ,is another large property.

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This is the Leiter mine, on Wisconsin creek. The owners are L. Z. Leiter and T. B. Leiter. Work and development is carried on through tunnels, from one of which a shaft has been sunk to a depth of 400 feet. This is equipped with a first-class mine hoist. The ore is free milling and treated in a 20-stamp mill, situated 2,700 feet from the mine. A gravity tramway connects the two and transports the ore for treatment. About 55 men are employed at this property.

The Easton mine has been a heavy producer of silver and gold. It is the property of Henry Elling and is situated on Mill creek, about five miles from Alder gulch. The discovery and improvement of this property have both been of recent date. The development is by tunnels of considerable length and reveal valuable ore bodies. The second-class ores are worked by concentration in a plant at the mine, while the better grade of ore is treated at the Easton mill, at the junction of Granite and Alder creeks. This mill, when in operation, handles about 30 tons of ore a day. Like other silver producers throughout the state, the Easton was idle a portion of 1897. The concentrator at the mine was operated from June 1 to Dec. 31, and the product shipped to a smelter for treatment.

The Kennett mine is about four miles from Virginia City ,on the divide between the Ruby and Madison valleys. Heavy improvements were undertaken during the year to place the property among the largest of the producing mines in the country. These included a comprehensive development of the mine and the erection of a 60-stamp mill at some distance from the mine. The extraction and milling of the ore, which is free milling and low grade, will be actively prosecuted during the coming summer. The building of the mill and the development at the mine has given employment to a considerable force of men.

The Thistle mine is the principal property in the McCarty range in the western part of the county. It is located at Rochester.

Besides the mines named, many properties in Madison county have produced precious metals during the year. the total of which has been considerable. Development and prospecting are going on steadily, affording work for many men. Success is being generally realized by the mining class in all sections of the county.

The output from the placers of Madison county was a large item in the total production. Alder gulch and its tributaries are still worked to a great extent. The German Bar Placer Mining company erected and operated a placer mining plant below Virginia City. Their operations proved to be successful and they have since by purchase and bond acquired control of a large amount of placer ground in different sections of the county on which they intend to erect machinery for handling the gravel and securing the gold. Besides the placers along Alder gulch ,other producing gulches were Bivens, Harris, Norwegian and Barton.

MEAGHER COUNTY.

Meagher county is that portion of Montana lying between the Big Belt and Little Belt mountains, near the center of the state. The output of precious metals in 1897 was as follows:

Gold, 282.598 fine ounces	$ 5,841.82
Silver, 148,546.50 fine ounces	192,060.12
Lead, 7,091,591 fine pounds	255,309.28
	$453,211.22

The production of gold was from the mines and placers of the portions that were formerly included in Meagher county and afterward segregated by the legislature to be annexed to other counties.

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Since the division of the county the only district producing has been that about Castle. It was from this district that the silver and lead output originated. A large per cent of this output was contained in ore that had been mined and stored on the dumps at the different mines prior to the building of the Montana railroad into this district. The mines at Castle, now undergoing development preparatory to becoming producers, include the Cumberland, Yellowstone, Great Eastern and Judge. The ore from these is carbonate and carries silver associated with lead. The Yellowstone is about three miles from Castle and employs about 15 men. This property is worked to a depth of 400 feet by a double compartment shaft, equipped with hoisting engine and apparatus. The Great Eastern is about the same distance from Castle as the Yellowstone. The main shaft has reached a depth of only 115 feet and hoisting is done with a whim. The Judge is equipped with a hosting engine and explored to a depth of about 250 feet. The ore from all of these properties is shipped to lead smelters for treatment.

MISSOULA COUNTY.

Missoula county is in the western portion of the state, between Flathead and Ravalli counties. Since the closing down of the Iron Mountain mine at Pardee, in last May, the precious metals yielded by this county have been from the placers along the various streams, principal among which are Cedar Creek and Quartz Creek. The output of gold and silver in 1897 by Missoula county was valued at $58,714.79 and $402,502.98 respectively.

PARK COUNTY.

The yield of gold and silver from this county was small and consists almost entirely of placer gold from the streams in the Upper Yellowstone country.

RAVALLI COUNTY.

This county lies along the western boundary of the state, south of Missoula county. The principal producer in the county during the past year was the Helena & Victor Mining company, whose property and plant are located at Victor. The mine of this company is known as the Curlew, which has a development of 200 feet in depth. The values contained in the ore are silver and lead.

The White Cloud mine is a Ravalli county property, which is being put in shape to undertake a large production in the near future. It is situated about eight miles from Florence. Development has reached a depth of over 150 feet. A steam hoist carries the ore to the surface. This is pyritic iron, carrying gold. A concentrator having a capacity of 150 tons is being erected.

SILVER BOW COUNTY.

Silver Bow county lies south of Deer Lodge county, and is the largest precious metal producing region in the world. The mining activity is centered about the city of Butte, which is characterized as the greatest mining camp on earth. All of the mines are within a radius of three miles from the center of Butte, and their production in 1897 was as follows:

	Value.
Gold, 54,198.037 fine ounces	$ 1,120,372.86
Silver, 10,710,815.45 fine ounces	13,848,327.04
Copper, 236,826,597 fine pounds, at $11.30 per cwt	26,761,405.46
	$41,730,105.36

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Corresponding figures for the previous year of 1896 were:

Gold, 59,815.755 fine ounces	$ 1,236,601.40
Silver, 11,120,731.78 fine ounces	14,378,319.89
Copper, 228,886,962 fine pounds, at $10.92 1-2 per cwt	25,005,900.60
	$40,620,721.89

This is an increase of more than a million dollars in this county during the past year.

The production of the Butte mines dates from 1882, and the following table shows the output to have been more than $375,000,000 during the past 16 years:

Year.	Gold. Fine ounces.	Silver. Fine ounces.	Copper. Fine ounces.
1882	12,093,750	2,699,296.38	9,058,284
1883	14,560.875	3,480,468.75	24,664,346
1884	21,776,006	4,481,180.36	43,093,054
1885	13,838.297	4,126,677.60	67,797,846
1886	31,223.450	5,924,180.38	57,611,485
1887	48,175.743	6,958,822.92	78,700,000
1888	44,320.062	8,275,768.87	98,504,000
1889	31,652,325	6,560,038.75	104,589,000
1890	25,704.730	7,500,000.00	112,700,000
1891	29,395.356	7,985,089.77	112,383,420
1892	36,222.560	8,311,130.82	158,413,284
1893	33,807,877	6,668,730.16	159,875,499
1894	36,768.015	7,561,124.46	185,194,385
1895	41,433.363	10,051,760.52	197,190,659
1896	59,815.755	11,120,731.78	228,886,962
1897 (estimated)	58,500.000	11,900,000.00	236,800,000
	539,288.164	113,605,001.52	1,875,462,242

Figuring the gold and silver at their coinage values and copper at 12 cents per pound, the total output of the three metals in Silver Bow county has been—

Gold	$ 11,148,075.74
Silver	146,883,234.29
Copper	225,055,467.04
Total	$383,086,777.07

The above figures convey a better idea of the scope of mining in Silver Bow county than any description of the many mines, hoists and smelters can do, and none will therefore be attempted, other than to give some data generally taken as authentic in connection with the Anaconda company, which operates the most extensively of any located in the Butte district. Nearly $80,000,000 have been expended by this company in the development and operation of its mining interests, and the erection and operation of its immense smelting plant at Anaconda. The company owns about 100 of the best lode claims in the Butte district on which one of the most perfect hoists ever built has been erected. This is capable of sinking to the great depth of 5,000 feet. The development of these mines has been kept ahead of the output until an aggregate of 3,000,000 tons of ore are in sight. The company conducts general mercantile, lumber and other business enterprises that are each the most stupendous of its kind in the northwest. The number of men employed at the mines is 2,500 ,and at the smelters about 3,000. The mines of the Anaconda company are developed and worked to a depth of 1,300 feet.

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Among the companies that are mining and smelting extensively at Butte are the Anaconda, the Boston & Montana, the Parrot, the Colorado, the Montana Ore Purchasing company, the Butte Reduction works, the Lexington and the Alice.

An industry that yields a large amount of copper is that of the copper precipitation plant. It is located on the side hill just below the Anaconda mine. As the water impregnated with sulphide of copper in solution is pumped from the mine it is led into a large number of vats filled with all sorts of scrap iron and tin cans. Chemical action occurs and the copper is precipitated and its place in the soluble salt taken by the iron. The recovery by this plant averages one hundred tons of metallic copper per month.

DEPOSITED AT THE UNITED STATES ASSAY OFFICE, HELENA, MONTANA, DURING THE CALENDAR YEAR, 1897.

	Gold		Silver		
Counties.	Standard ounces.	Value.	Standard ounces.	Com. value.	Total value.
Beaverhead	8,419.937	$156,649.94	560.33	$296.58	$156,945.52
Broadwater	1,501.741	27,939.33	207.21	104.61	28,043.94
Carbon	123.707	2.301.54	8.37	4.17	2,305.71
Cascade	23,385	435.07	1.92	.90	435.97
Choteau	16.688	310.47	1.81	1.00	311.47
Custer	5.819	108.26	.48	.26	108.52
Deer Lodge	19,341.439	359,340.62	3,989.98	2,102.41	361,943.03
Fergus	3,146.948	58,547.84	226.54	121.98	58,669.32
Flathead	1,283.992	23,888.21	313.97	169.70	24,057.91
Granite	4,148.406	77,179.64	1,132.23	618.04	77,797.68
Jefferson	2,449.236	45,567.11	416.59	215.69	45,782.80
Lewis and Clarke	22,947.347	426,927.05	13,083.54	6,720.26	433,647.31
Madison	6,695.629	124,569.81	1,836.66	939.09	125,508.90
Meagher	313.998	5,841.82	31.60	17.02	5,858.84
Missoula	2,747.035	51,107.55	104.20	51.86	51,159.41
Park	470.390	8,751.47	67.04	34.28	8,785.75
Ravalli	90.855	1,690.32	8.28	4.17	1,694.49
Silver Bow	3,364.360	62,592.70	707.69	358.48	62,951.18
Teton	122.638	2,281.65	5.64	3.02	2,284.73
Total for Montana	77,213.550	$1,436,530.40	22,704.08	$11,762.58	$1,448,292.98
Other sources—					
Idaho	22,453.561	380,531.20	3,520.40	1,850.67	382,381.87
Washington	4,634.212	86,217.86	1,091.13	577.19	86,795.05
Oregon	2,342.352	43,578.64	474.95	257.08	43,835.72
Wyoming	6,759	125.75	.45	.27	126.02
Utah	28.368	527.78	.09	.05	527.83
Canada	17,298.561	321,833.65	5,041.86	2,698.38	324,532.03
Jewelry	140.077	2,606.08	40.79	22.69	2,628.77
Re-deposits	282.422	5,254.38	131.48	72.27	5,326.65
Total	45,186.312	$840,675.34	10,301.15	$5,478.60	$846,153.94
Grand total	122,399.862	$2,277,205.74	33,005.23	$17,241.18	$2,294,446.92

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PRODUCTION OF GOLD AND SILVER IN MONTANA DURING THE CALENDAR YEAR 1897.

Summary by Counties.	Gold		Silver	
	Fine ounces.	Value.	Fine ounces.	Coining value.
Beaverhead	12,383.324	$255,986.03	216,673.67	$280,143.73
Broadwater	11,644.357	240,710.22	409,567.84	529,542.26
Carbon	111.336	2,301.52	7.53	9.74
Cascade	490.046	10,130.15	385,844.69	498,869.90
Choteau	216.066	4,466.48	21.43	27.71
Custer	5.237	108.26	.43	.56
Deer Lodge	18,143.307	375,055.44	9,111.45	11,780.46
Fergus	3,148.559	65,086.49	237.36	306.89
Flathead	1,168.494	24,154.91	61,209.75	79,139.88
Granite	9,136.252	188,863.09	450,188.26	582,061.59
Jefferson	7,878.934	162,872.02	761,240.64	984,230.32
Lewis and Clarke	31,762.517	656,589.49	131,077.04	169,473.34
Madison	32,771.644	677,450.01	62,412.33	80,694.73
Meagher	282.598	5,841.82	148,546.50	192,060.12
Missoula	2,840.328	58,714.79	311,310.90	402,502.98
Park	423.351	8,751.44	60.34	78.01
Ravalli	87.669	1,812.28	30,301.42	39,177.58
Silver Bow	54,198.037	1,120,372.86	10,710,815.45	13,848,327.04
Teton	110,374	2,281.63	5.08	6.57
Returns from custom smelters, mints and assay offices, impossible to classify by counties	30,712.416	634,881.99	3,118,713.95	4,032,276.62
Total production	217,514.846	$4,496,430.92	16,807,346.06	$21,730,710.03

BULLION OF MONTANA PRODUCTION DEPOSITED AT THE UNITED STATES MINTS AND ASSAY OFFICES DURING THE CALENDAR YEAR 1897.

Origin.	Gold		Silver			
	Standard ounces.	Value.	Standard ounces.	Commercial Value.	Total value.	
Placer gold	27,051.013	$503,274.24	3,324.44	$1,688.07	$504,962.31	
Mill bullion	50,162.537	933,256.16	19,379.64	10,074.51	943,330.67	
Total	77,213.550	$1,436,530.40	22,704.08	$11,762.58	$1,448,292.98	

BULLION OF MONTANA PRODUCTION DEPOSITED AT THE UNITED STATES MINTS AND ASSAY OFFICES DURING THE CALENDAR YEAR 1897.

Institution.	Gold		Silver		
	Standard ounces.	Value.	Standard ounces.	Coinage Value.	Total value.
Assay offices—					
Helena	77,213.550	$1,436,530.40	22,704.03	$26,419.29	$1,462,949.69
New York	35,637.561	663,024.39	1,521,810.22	1,770,833.71	2,433,858.10
Boise	3,362.195	62,552.46	179.16	208.48	62,769.94
Mints—					
Philadelphia	722.317	13,438.46	1,476.83	1,718.49	15,215.78
Denver	118.318	2,201.26	12.48	14.52	2,215.78
San Francisco	99.484	1,850.86	7.63	8.88	1,859.74
Total	117,153.425	2,179,597.83	1,546,190.40	$1,799,203.37	$3,978,801.20

PRODUCTION OF GOLD AND SILVER IN MONTANA (ORIGIN DETAILED) DURING THE CALENDAR YEAR 1897.

Origin.	Gold		Silver		
	Fine ounces.	Value.	Fine ounces.	Coinage value.	Grand total.
Placer bullion	33,418.923	$690,830.43	5,098.48	$6,591.97	$697,422.40
Mill bullion	66,135.432	1,367,140.71	633,643.85	819,256.69	2,186,397.40
Cyanide mill bullion	9,993.117	206,576.06	33,937.50	43,878.79	250,454.85
In copper ores	51,463.070	1,063,836.08	10,710,317.02	13,847,682.60	14,911,518.68
In lead ores	8,529.345	176,317.22	4,175,792.56	5,399,004.52	5,575,321.74
In dry ores an concentrates classed as smelting ores	47,974.959	991,730.42	1,248,556.65	1,614,295.46	2,606,025.88
Total	217,514.846	$4,496,430.92	16,807,346.03	$21,730,710.03	$26,227,140.95

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ORIGIN BY PERCENTAGE—PRODUCTION OF GOLD AND SILVER IN MONTANA DURING THE CALENDAR YEAR 1897.

Origin	Percentage gold.	Percentage silver.
Placer bullin	10.36	.03
Mill bullion	30.40	3.77
Cyanide mill bullion	4.60	.20
Copper ores	23.66	63.72
Lead ores	3.92	24.85
Dry ores	22.06	7.43
Totals	100.00	100.00

PRODUCTION OF COPPER AND LEAD IN MONTANA DURING THE CALENDAR YEAR 1897.

Summary by Counties.	Copper. Fine lbs.	Lead. Fine lbs.
Beaverhead	184,836	1,090,175
Broadwater	.....	1,848,111
Cascade	.....	1,338,836
Flathead	.....	1,920,000
Granite	19,473	.....
Jefferson	10,000	366,015
Lewis and Clarke	.....	25,000
Madison	17,890	88,319
Meagher	.....	7,091,591
Missoula	1,929	3,620,331
Ravalli	.....	382,272
Silver Bow	236,826,597	.....
Custom smelters in addition to above	97,815	8,024,324
Total production	237,158.540	25,794,974

DISPOSITION OF GOLD AND SILVER OF MONTANA PRODUCTION DURING THE CALENDAR YEAR 1897.

Disposition.	Gold— Fine ozs.	Gold— Value.	Silver— Fine ozs.	Silver— Coining value.	Total value.
Deposited at the United States mints and assay offices	105,438.083	$2,179,597.83	1,391,571.36	$1,799,203.37	$9,978,801.20
Shipped to custom smelters and refineries by producers	112,076.763	2,316,833.09	15,415,774.70	19,931,506.66	22,248,339.75
Total	217,514.846	$4,496,430.92	18,807,346.06	$21,730,710.03	$26,227,140.95

TOTAL PRODUCTION OF PRECIOUS METALS IN MONTANA DURING THE CALENDAR YEAR 1897.

Description.	Quality.	Value.
Gold, fine ounces	217,514.846	$4,496,430.92
Silver, fine ounces (coinage rate)	16,807,346.06	21,730,710.03
Copper, fine pounds, at $11.30 per cwt	237,158,540	26,798,915.02
Lead, fine pounds, at $3.60 per cwt	25,794,974	928,619.06
Total value of production		$53,954,675.03

This concludes the latest report of Mr. Braden's office, but conservative estimates for this year place the several mineral products as follows: $4,500,000 of gold, 16,250,000 ounces of silver, with a coinage value of nearly twenty-one and a quarter million dollars, and a commercial value of about nine and three-quarter million dollars; 242,000,000 pounds of copper and 22,000,000 pounds of lead.

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From Mr. Braden's report on the improved methods of treating ore, and not included in the foregoing article, we find that the combined capacity of the Anaconda Copper Mining company's works at Anaconda, the Boston & Montana Copper works at Great Falls, the Colorado Smelting & Mining company's works at Butte, the Montana Ore Purchasing company's works at Butte, the Parrot Smelting & Mining company's works at Butte and the Butte Reduction works at Butte, exceeds ten thousand tons of ore per day.

The Inspection of Mines.

The report of Mine Inspector Byrne indicates an appreciable improvement in the conditions and the mining interests of the state. The report covers the detail of the work of inspection done by this office and reviews the work of the more prominent mines of the state.

Of the fatalities, Mr. Byrne finds there were fewer than during either of the previous two years, and that caving and falling rock and explosions have been the most prolific source of danger ,and he incorporates a chapter in his report on the proper handling of explosives, which, if followed, would greatly lessen the mine casualties. He also makes a determined stand for the enforcement of the statute requiring the use of enclosed cages in the deep mines. He also makes timely recommendations as to the speed at which cages may be lowered and for other regulations necessary to the safety of the thousands of men who daily work in the mines.

The following table shows the number of men employed and the accidents that have occurred during the past six years:

	1893	1894	1895	1896	1897	1898
Men employed	5,312	7,082	8,758	7,727	9,825	11,096
Mines inspected	56	78	88	78	130	136
Fatal accidents	29	27	41	64	52	48
Non-fatal accidents	4	19	18	21	29	29
Total accidents	33	46	59	85	81	77
Per cent of accidents to men employed	.62	.65	.67	1.10	.82	.69

Continuing, the report says that this has been a year of progressive prosperity to the mining interests. Fewer suspensions have occurred than for many years past, and most of the mines closed down have done so but temporarily. On the other hand, many famous producers have again resumed active operations.

In the list of recent discoveries which have developed into handsome paying mines, the following deserve mention:

The Big Seven, situated on Snow Creek, some seven miles from Neihart, must be given first place; the Mayflower and its extension, the West Mayflower, in Madison county; the Gray Eagle and B. & G., in Jefferson county; the Cruse mine, in Lewis and Clarke county, and Nancy Hanks and Shamrock mines, in Granite county, all of which should now be considered as among the permanent producers. The result of the development carried on during the past year clearly prove these veins to be both valuable and permanent.

The Butte district was never more active than in the year now closed. The Green Mountain mine is now below the 2,000 foot mark, while several others are approaching it. The era of deep mining has arrived. During 1897 and 1898 the Anaconda company has equipped a number of its principal shafts with massive deep mining engines, capable of developing these mines to a depth of 5,000 feet.

Indications early in the season pointed to a decreased output by some of the large concerns, due in part to litigation, and on account of a large portion of two of the leading producers having to close through the discovery that a fire, which

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had been smoldering for years, and which the mine officials thought had been extinguished, was still burning. The inconvenience and delay attending the construction of new plants has also been a serious handicap, so much so, that the Anaconda mine has not hoisted any ore for several months. The reports received for 1897 and 1898, coming from those affected by the causes named, shows but a very slight decrease and warrants the belief that with the removal of those causes we may expect a large increase in production for the coming year, many more men employed, and in general a year of great prosperity for the greatest mining city on earth.

The coal mining industry has exceeded all expectations in its march of progress. Carbon county has fully justified the name bestowed upon it by its founders. The first vertical shaft of any considerable depth has been sunk at Carbonado. A strong company has been organized to operate the property and the summer devoted to erecting buildings for an electric power and haulage plant, the first of its kind in the state. In the same field, and presumably on the same measure, is the Bridger mine, nine miles distant from Gebo. A slope prospects the measure to a depth of 1,800 feet. Branch railways started to the several mines during the summer are now rapidly approaching completion. Another coal field which has sprung into prominence is Trail Creek, situated in Park county. A railway is now under construction to tap this rich field. At Sand Coulee prospecting and all new work has stopped in the early part of the year, operations being confined to working out the reserves opened up in former developments. Within a year Sand Coulee will be abandoned, when all work will be transferred to the new camp of Stocket, six miles from Sand Coulee, the mines of which, though recently opened, are amply prepared to meet the demands made upon the older mine. At Belt a large amount of new territory has been explored, adding greatly to the visible supply and assuring a bright future for this thrifty camp. The miners and the company suffered a severe loss through the destruction of the washing plant and bunkers by fire on April 15, entailing a loss of $125,000 and depriving of employment those engaged in the manufacture of coke. A large force of mechanics are at present engaged in rebuilding the plant, which, when completed, will add at least 100 men to the present working force.

A new process mill has been erected at the Belmont, and its success will have a marked influence on the mining interests of the Marysville district, as well as on that large area of territory adjoining, the ores of which are of the same character. The process consists of a combination of amalgamation and cyanide. The quartz, after being crushed in the 20-stamp battery and passing over the plates, in which process 50 per cent of the values contained is saved, is conducted in the form of tailings into large settling tanks, where they are subjected to the action of the solution and practically all the values remaining after passing over the plates liberated. The mine is developed by three tunnels.

The report continues in a detailed and exhaustive review of the mines of the state, covering much of the ground that is given full attention in this volume in the report of Mr. Eugene Braden, assayer in charge of the government assay office at Helena.

The Coal Industry.

It will be noted that there is a very material increase in the business for the year, and the indications are that with the opening of the several new mines mentioned in the descriptive department of this volume, will make the aggregate output for next year very much larger.

During the season there were 223,490 tons of coal converted into coke, the report

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giving the coke product of this coal at 72,600 tons, valued at $235,000. The capacity of the coke ovens is given at 243 tons per day, and the number in operation on the last day of June, 203, and these were operated 289 days during the fiscal year.

Sixteen mines with an investment in land of $67,466.66, $955 in machinery, $3,074 in buildings, $14,933 in development, representing a total investment of $87,229.66, are reported to have been idle. The two reasons given for the failure to make these mines produce are a lack of capital and shipping facilities, the railroads being too distant.

REPORT OF COAL INDUSTRY FOR 1898—FIRST PART.

Tracing number	Area of Coal lands owned or controlled	Area of Coal lands worked out	Kind of power used	No. Horse power	Character of Coal.	Dip of vein in degrees	Number of seams	Total thickness of workable seams	Is mine worked through drift, slope or shaft	Greatest length of drift	Greatest vertical depth of present workings	No. days mine worked during the year	Av. No. of Employes: Below ground. Men	Av. No. of Employes: Above ground. Men	Total output of coal year ended June 30, 1898	Total value of output at mine
1	640	0	horse	1	Lignite	45°	3	4	(a)	300	250	150	7	5	.....	6,750 00
2	4,229	40	(b)	320	Semi-bituminous	18°	6	48	slope.	9,320	600	265	290	32	264,847	384,680 70
3	40	1	h orse	1	Bituminous	Level	2	6	drift	3	600	100	1	1	500	1,000 00
4	40	5	men	...	"	"	1	6	"	5	2	312	.....	.....	7,000	14,000 00
5	80	0	.....	....	Lignite	.....	1	5	"	25	125	2	.....	.....	300	900 00
6	2,047	1,950	steam	600	Bituminous	Level	1	7½	"	10,560	....	222	423	64	378,085	699,457 24
7	1,800	400	(d)	1000	"	6°	1	6½	"	7,000	3	280	651	124	405,400	583,112 90
8	107	1	h orse	1	"	Level	1	8	"	12	....	80	4	1	1,400	2,450 00
9	40	2	.....	...	"	"	1	8	"	4	....	15	7	1	2,500	5,000 00
10	160	0	.....	....	Lignite	22½°	3	11	"	2	....	100	5	.....	500	1,000 00
11	30	2	h orse	1	"	Level	1	3	slope.	125	30	156	6	.....	600	1,200 00
12	25	2	"	1	"	"	1	3	drift	290	....	234	7	3	2,475	3,712 53
13	160	0	men	...	"	"	1	3	"	4	70	2	4	.....	500	1,500 00
14	4	.....	h orse	1	Bituminous	15°	1	3	(e)	1,100	75	3	8	1	2,000	6,000 00
15	160	2	men	....	Lignite	Level	3	4	drift	4	5	225	2	.....	300	750 00
16	8	1	h orse	1	(f)	30°	4	6	(g)	2	15	15	2	1	100	275 00
17	157	6	.....	....	Soft	Level	1	3	drift	4	1	305	4	.....	1,800	5,400 00
18	4	0	men	....	Bituminous	40°	3	5	"	75	75	48	2	.....	60	15 00
19	640	80	mule	....	"	25°	3	12	"	2,500	....	230	200	46	120,000	240,000 00
20	1,820	320	steam	40	"	30°	1	4½	slope	1	3	25	35	5	10,000	16,000 00
21	1,900	600	h orse	....	Semi-Bituminous	3½°	1	6	"	6	....	90	10	.....	1,500	750 00
22	.....	.....	.....	....	" "	83°	1	10	drift	6,500	900	.....	.....	.....	97,500	156,000 00
	13,695	3,412	.....	....	.....	.....	....	....	.....	.....	....	4137	1,668	284	1,357,427	2130,094 37

REPORT OF COAL INDUSTRY—SECOND PART.

Tracing Number	Average cost per ton delivered on railroad cars	Average price per ton paid to miners	Do you pay miners for all the coal mined or only for screened coal	Is miner charged for powder	Is miner charged for oils	Is miner charged for smithing	Average cost of powder oils, and smithing to each man	Average net daily wages paid to miners	Average output per day per man	Amount of money invested in the business.	Amount of business done during year.	Amount paid to labor during the year.	Per cent increase over previous year	Per cent decrease under previous year
1	3 00	day	Screened	no	no	no	.....	2,50 3,00	....	14,000 00	.....	.....	.....	.....
2	1 45	75-90	"	yes	yes	yes	15 to 20	3 25	4	2,000,000 00	384,686 71	271,963 89	10	.....
3	2 00	.....	"	"	"	"	.....	2 85	....	2,000 00	1,000 00	.....	.....	.....
4	1 35	95	"	"	"	"	.....	2 50	5	2,500 00	14,000 00	10,000 00	10	.....
5	.....	day	.....	no	no	no	.....	2 25	....	5,000 00	1,000 00	800 00	(c)	.....
6	.....	1 00	Screened	yes	yes	yes	50	4.00 5.00	4-5	500,000 00	699,457 25	469,203 49	yes	.....
7	1 25	75	"	"	"	"	35	3 02	4½	.....	583,112 91	531,825 00	.....	.....
8	1 50	1 00	"	"	"	"	25	3 75	4	4,000 00	2,450 00	1,280 00	same	.....
9	.....	day	.....	no	no	no	.....	3 50	....	.....	5,000 00	4,200 00	2	.....
10	3 00	"	.....	"	"	"	.....	2 00	....	1,000 00	1,600 00	640 00	same	.....
11	2 75	"	.....	"	"	"	.....	3 00	....	500 00	1,500 00	700 00	.....	.....
12	.....	"	.....	"	"	"	.....	2.00 3.00	2-3	2,500 00	600 00	5,000 00	yes	.....
13	.....	"	.....	"	"	"	.....	4 00	2	.....	1,500 00	3,200 00	.....	.....
14	.....	2 00	Screened	yes	yes	yes	25	3 50	2	2,500 00	10,000 00	5,000 00	25	.....
15	.....	day	.....	no	no	no	.....	2 00	1¾	500 00	750 00	300 00	same	.....
16	.....	"	.....	"	"	"	.....	2 00	1-2	250 00	500 00	200 00	.....	10
17	.....	2 00	Screened	"	yes	.....	10	3 00	1½	2,000 00	5,100 00	1,700 00	.....	.....
18	3 00	1 00	All mined	"	no	no	.....	2 00	4	500 00	300 00	200 00	same	.....
19	1 50	75	"	"	yes	yes	01½	3 00	5	45,000 00	240,000 00	160,000 00	.....	12
20	1 00	80	"	yes	"	"	10	3 30	4½	640,000 00	20,000 00	16,000 00	30	.....
21	2 00	75	Screened	"	"	"	.....	3 00	1	6,700 00	750 00	1,000 00	.....	.....
22	1 49	90	All mined	no	"	"	07	.....	....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	....	3,128,050 00	1978,406 87	1536,212 38	.....	.....

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The Saw Mills.

While there is some diversity of opinion expressed by the lumbermen as to the condition of the industry the past year, a large majority report an increase and the output greatly exceeds that of last year. Of 109 returns made to the bureau, 58 give reasonably full reports, and these are considered in detail and embodied in the accompanying table. Of the other returns, thirty-five were so incomplete that they could not be used in the report, and 16 were but partial reports, 11 of which are summarized in the last line of the table for the purpose of completing the totals. The prevailing day is one of 10 hours, but one firm reporting 12 and one other 10 1-2 hours as a day. But six firms report the condition of their business as having fallen below that of 1897, while 15 report it the same, two fair, one good, and 17 report an increase of from 10 to 75 per cent. Of the 58 reports tabulated, but few answered every question, 22 reporting the number of female employes, 50 the number of male employes, 54 the length of a working day, 51 the length of time the mills have been operated during the season, 56 the amount of capital invested, 49 the business done, 46 the amount paid out for labor during the season, 56 the output and 41 the condition of business.

REPORT OF SAW MILLS FOR 1898.

Tracing Number	No. Employed. Male	Female	Total	No. weeks mill operated.	Amount invested in the industry.	Amount paid for Labor	Amount of business done	No. feet Lumber cut.	Condition of business as compared with 1897
1	196	4	200	52	$700,000	$160,000	$540,000	27,976,258	Fair.
2	6	.....	6	24	1,500	.....	2,600	200,000	Bad.
3	.....	.....	6	8	1,000	2,650	3,125	284,000	Quit .....
4	4	.....	4	36	2,000	1,300	3,300	15,500	Same .....
5	5	.....	5	12	5,000	700	1,500	400,000	50 per cent. increase.
6	.....	.....	.....	6	400	400	1,200	120,000	Not so good.
7	2	2	4	10	2,500	400	1,200	50,000	20 per cent. decrease
8	4	.....	4	6	3,000	.....	1,900	100,000	As good ....
9	10	.....	10	.....	3,500	.....	.....	700,000	.....
10	15	.....	15	25	2,000	8,000	10,000	2,000,000	Same .....
11	4	.....	4	30	3,500	2,070	3,500	400,000	.....
12	1	.....	1	10	900	50	300	550,000	.....
13	3	.....	3	6	1,500	198	1,500	300,000	.....
14	36	1	37	16	5,000	4,000	18,000	3,000,000	Same ....
15	5	.....	5	16	1,000	200	5,000	125,000	Same .....
16	25	.....	25	26	20,000	16,000	20,000	3,000,000	Same .....
17	27	.....	27	48	12,000	21,550	30,000	400,000	25 per cent. increase.
18	4	.....	4	12	2,000	1,000	3,200	320,000	Same .....
19	1	.....	1	8	500	60	1,000	75,000	.....
20	4	.....	4	.....	8,000	.....	.....	100,000	Same .....
21	.....	.....	.....	.....	200	.....	420	45,000	.....
22	6	.....	6	37	3,000	1,800	6,000	700,000	20 per cent. increase
23	7	1	8	28	2,000	1,848	5,040	504,000	10 per cent. increase.
24	10	.....	10	3	400	250	1,800	300,000	20 per cent. increase.
25	.....	.....	.....	8	1,000	.....	.....	100,000	.....
26	6	... ...	6	32	1,500	800	3,500	250,000	40 per cent. increase-
27	5	.....	5	52	10,000	4,000	20,000	60,000	10 per cent. increase
28	5	.....	5	12	.....	2,000	.....	100,000	.....
29	3	.....	3	10	1,000	400	1,400	350,000	20 per cent. increase ...
30	4	.....	4	8	1,500	208	855	165,000	.....
31	25	.....	25	24	7,000	7,000	17,000	2,800,000	10 per cent. increase
32	40	2	42	30	8,000	13,400	25,000	4,000,000	.....
33	22	1	23	20	2,500	6,580	8,000	1,400,000	.....
34	2	1	3	52	1,700	1,000	.....	10,000	75 per cent. increase.
35	.....	.....	.....	.....	.....	.....	.....	80,000	.....
36	10	1	11	52	2,500	4,000	8,000	800,000	Same .....
37	4	.....	4	.....	1,500	1,000	1,500	150,000	Same .....
38	20	2	22	10	3,000	.....	400	1,100,000	10 per cent. increase....
39	3	.....	3	20	3,000	.....	.....	600,000	Same .....
40	.....	.....	.....	6	400	600	.....	60,000	Same .....
41	8	.....	8	3	8,000	2,500	1,200	800,000	25 per cent. decrease ....
42	.....	.....	.....	1	250	400	.....	40,000	Bad.
43	4	1	5	26	2,000	6,000	1,500	500 000	25 per cent. increase.
44	4	1	5	42	4,000	6,000	1,840	250,000	30 per cent. increase.
45	3	.....	3	24	1,000	1,620	630	100,000	Same .....
46	3	.....	3	.....	1,200	700	809	.....	.....
47	3	.....	3	.....	1,000	1,870	340	187,000	.....
48	8	.....	8	30	2,000	5,000	1,000	200,000	Not so good .....
49	3	.....	3	40	3,000	1,825	1,080	200,000	25 per cent. increase.
50	47	3	50	52	150,000	210,000	.....	15,000,000	Favorably .....

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Report of Saw Mills for 1898—Continued.

Tracing Number	No. Employed. Male	Female	Total	No. weeks mill operated	Amount invested in the industry	Amount paid for Labor	Amount of business done	No. feet Lumber cut.	Condition of business as compared with 1897
51	40	.....	40	35	15,000	35,000	16,000	5,000,000	Same .....
52	.....	.....	.....	6	1,000	4,000	2,500	400,000	75 per cent. decrease .....
53	20	.....	20	16	6,000	.....	.....	1,000,000	Same .....
54	4	1	5	8	1,500	360	250	50,000	.....
55	5	1	6	5	1,100	243	159	101,000	.....
56	22	.....	22	52	10,000	22,000	11,520	2,750,000	50 per cent. increase .....
57	4	.....	4	30	600	8,000	2,100	.....	.....
58	22	.....	22	52	10,000	20,000	10,500	3,000,000	10 per cent. increase. .....
58	66	....	66	264	40,750	39,516	7,646	6,162,000	.....
....	790	22	812	1,493	1,083,900	1,127,174	317,019	90,229,758	

Iron Foundries and Machine Shops.

Reports have been received from 10 foundries this year, as against 11 for 1896 and 8 in 1897.

From these reports it appears that there were 399 persons employed on the 30th of June by these 10 concerns, against 144 employed by the eight foundries reporting last year.

The total capital invested by nine of the ten concerns reporting this year is $278,500. Eight foundries in 1897 reported an investment of $236,400. The aggregate business done in 1898 by nine of the ten reporting was $299,500, but this does not include the output of the largest of these industries in the state, which made a very complete report except on this one item, and that of the amount invested, which it declined. During the year this institution paid out $274,588.80 for wages. The amount paid for labor by the ten reporting was $358,279.84, against $129,842.50 paid the previous year. The discrepancy apparent between the amount reported as paid for wages and the product is accounted for by the absence of the output report mentioned.

Several of the foundries report an increased capital invested in the business, as compared with 1897, indicating their enlargement to meet the increased demand of their trade.

Five of the foundries were operated full time during the entire year; five report business the same as during the previous year; two report business "good," while on this point the others make no report. In all the concerns reporting, 10 hours constitute a day's work and six working days a week, with Sundays and extra hours of labor allowed as over-time. The wages are paid monthly in cash. No serious accidents have occurred.

The moulding of castings and the manufacture of mining machinery constitutes the larger part of foundry work, though but little of this work is received from the larger mines, as these have extensive machine shops operated in connection with them.

None of the machine shops owned and operated by the railway companies in making and repairing their own equipment are included in this report, but the aggregate number of men employed in these is greater and the volume and value of business done is as large as the commercial concerns that have been considered.

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supervisors. Not
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The Flour Mills.

An analyzation of tabulated returns that have been received from the flour mills of the state, indicate that the industry has experienced a year of unusual prosperity, as in complete returns from 16 of the more prominent mills, of the 10 that answer the query as to the condition of their business, nine report an increase that ranges from 10 to 80 per cent and averages 32.7 per cent. All of these mills report the number of employes but two, the total number given being 76 male and 3 female. The mills considered are all using the roller process except one, and the exception is not of importance. The total number of rolls used is 110, and these were in operation an aggregate of 481 weeks, and during that time ground 1,020,010 bushels of wheat, 125,000 bushels of which was imported, manufacturing 42,236,506 pounds of flour and 11,807,000 pounds of feed, the total product being approximately worth $1,090,000. All of the home wheat that was used at the mills is reported as No. 1, the weights given being between 58 and 62 pounds to the bushel, and the average price paid was 72 3-4c per bushel. The total daily capacity of the mills is reported as 1,795 barrels. The aggregate amount of capital invested in these plants is $585,000, and the amount paid out during the year for wages was $67,696. The total amount of business done during the year by these industries is placed at $1,386,310. One 50-barrel, one 75-barrel and one 125-barrel mill are reported idle, but the reasons given for their suspension do not relate to the condition of the trade.

The flour manufacturing industry of Montana is in its earliest infancy, but a comparison with the report of last year indicates that it is rapidly coming to the front as one that in the near future will be of the greatest importance, and gives promise of the fulfillment of the assertion of Ex-Senator Gibson, of Great Falls, made some 10 years ago, that the day was not far distant when Montana would equal Minnesota as a wheat and flour producing state. One of the special advantages that seems about to open for this industry is the Asiatic trade, which gives promise of increasing to proportions that are not now generally appreciated, and for which Montana has the advantage of being the nearest hard wheat state, and with the additional advantage of enough water power that can be economically utilized to grind all the wheat in all the states.

But to compare the industry of this year with that of last: The wheat consumed by the mills this year exceeds that of last year by 419,322 bushels, and the imported wheat has decreased 47,000 bushels. Last year 27,119,609 pounds of flour represented the total flour product, while this year the output is 15,116,897 pounds in excess of that amount. The number of employes has increased a seventh, showing what is a well known fact, that the product of flour mills can be greatly increased without a great increase of the number employed. For the money invested, the business done and the profits made, the flour mills are the smallest employers of labor in the state, but it may be said that the mills of this state are no exception in this respect; the process of flour manufacture does not require a large investment in labor.

The returns received were unanimous in the assertion that the wheat raised in this state is fully equal to that raised in North Dakota and northern Minnesota, and that the quality of flour produced was fully up to the standard of those states, and also that the increase of home patronage has been very marked.

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FLOUR MILLS FOR 1898.

Trade Number	No.	No.	Amount of Capital	Amount paid for Labor	No. Rolls	No. Bushels of wheat ground	No. Bushels imported	Av. Price	Flour. Total lbs. Flour Produced	Feed. No. lbs. Feed Produced	Capacity of Mill	Per cent. Increase prod'd over 1897
											bbls.	
	....	....	30,000	.....	.....	.....	.....	.....	.....	.....	125	.....
	14	52	100,000	450,000	23,000	26	240,000	125,000	80	15,040,000	609,000	450	25
	15	40	200,000	600,000	12,000	13	300,000	.....	70	12,000,000	5,000,000	350	40
5	3	50	15,000	40,000	3,000	8	30,000	.....	73	1,200,600	60,000	60	.....
6	5	12	8,000	10,000	648	4	100,000	.....	70	400,000	200,000	200	.....
7	2	40	15,000	20,760	1,900	8	20,000	.....	65	800,000	360,000	50	.....
8	3	40	20,000	15,000	1,000	5	17,337	.....	70	693,480	315 000	75	80
9	10	52	75,000	20,100	9,000	10	100,000	.....	85	3,744,000	1,600,000	125	25
10	6	52	25,000	15,000	5,280	6	9,280	.....	75	332,000	221,000	50	10
11	3	40	6,000	1,875	1,040	4	18,000	.....	60	684,000	378,000	25	50
12	12	48	68,500	180,000	9,748	14	154,973	.....	.....	6,403,026	2,404,000	150	42
13	1	3	2,500	15,000	300	.....	420	.....	70	20,000	.....	.....	25
14	5	52	20,000	575	720	6	5,000	.....	75	20,000	10,000	60	.....
....	79	481	585.000	1,368,310	67,696	110	1,020,010	125,000	72¾	42,236,506	11,807,000	.....	.....

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The Breweries.

The breweries of the State show a considerable and almost universal increase in business for the year, there being but two exceptions among the 15 reporting. This, with that of malting, is destined to become one of the most important industries of the state, the barley raised in Montana having a world-wide reputation for its unequaled qualities for malt and beer making.

REPORT OF BREWERIES FOR 1898.

Trading Number..	Number of employes.....	Weeks brewery in operation during year.....	Amount invested in business.	Business done during the year.	Amount paid for Labor during year	Amount of Montana Barley used Bushels.	Amount of Barley imported. Bushels	Amount of Malt made Bushels	Amount of Malt imported. Bushels	Price of Barley .... Bush.	Value of Malt..... Bush.	Weight of Barley..... Bush.	Barrels of Beer made.	Value	Condition of business as compared with 1897. Increase Per cent.	Decrease Per cent.
1	40	52	$425,000	$300,000	$65,000 00	60,829	10,000	73,733	.....	65	68	52	38,775	$155,100	15	.....
2	14	52	60,000	60,000	17,000 00	10,000	.....	10,000	.....	60	125	48	5,000	30,000	10	.....
3	8	52	40,000	76,000	7,488 00	10,000	.....	5,240	.....	60	70	.....	5,320	42,560	.....	.....
4	24	52	100,000	114,440	15,678 35	.....	.....	12,000	6,800	.....	117	.....	11,222	78,554	10	.....
5	14	52	85,000	83,922	14,345 96	.....	.....	.....	13,300	.....	60	.....	11,480	50,000	25	.....
6	20	52	120,000	117,963	14,630 70	.....	.....	.....	20,000	.....	95	.....	13,107	78,642	20	.....
7	9	52	50,000	60,000	3,680 00	25,000	.....	.....	25,000	57	70	.....	5,300	13,000	15	.....
8	9	52	37,000	60,000	6,400 00	.....	.....	2,100	6,200	.....	82	.....	8,000	32,000	20	.....
9	7	52	35,000	25,000	5,400 00	5,500	.....	5,000	.....	55	50	50	2,300	11,500	25	.....
10	4	52	15,000	14,000	2,500 00	2,000	.....	1,500	.....	65	90	50	573	5,750	.....	.....
11	3	52	9,000	4,500	1,700 00	1,500	.....	1,500	.....	.....	.....	.....	500	4,500	.....	25
12	2	52	30,000	8,900	2,000 00	1,000	.....	1,000	.....	1.00	70	52	500	4,000	Same	.....
13	1	52	5,000	4,000	1,000 00	600	.....	600	.....	60	1.00	50	300	3,000	.....	.....
14	3	52	10,000	3,500	2,100 00	.....	.....	.....	1,400	.....	1.15	34	430	3,870	5	.....
15	32	52	250,000	135,000	20,000 00	40,000	.....	36,000	.....	62½	65	.....	16,000	135,000	5	.....
	189	.....	$1,271,000	$1,066,325	$178,923 01	156,429	10,000	148,673	72,700	.....	.....	.....	118,807	$647,476	.....	.....

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FLOUR MILLS FOR 1898.

Tract Number	No.										Flour.	Feed.		
											Total lbs. Flour Produced	No. lbs. Feed Produced	Capacity of Mill ..... bbls.	Per cent. Increase prod'd over 1897 ....
						6	25,000		75	900,000	650,000	75	30
			30,000									125	
	14	52	100,000	450,000	23,000	26	240,000	125,000	80	15,040,000	609,000	450	25
	15	40	200,000	600,000	12,000	13	300,000		70	12,000,000	5,000,000	350	40
56	3	50	15,000	40,000	3,000	8	30,000		73	1,200,600	60,000	60	
57	5	12	8,000	10,000	648	4	100,000		78	400,000	200,000	200	
58	2	40	15,000	20,760	1,960	8	20,000		65	800,000	360,000	50	
8	3	40	20,000	15,000	1,000	5	17,337		70	693,480	315 000	75	80
9	10	52	75,000	20,100	9,000	10	100,000		85	3,744,000	1,600,000	125	25
10	6	52	25,000	15,000	5,280	6	9,280		75	332,000	221,000	50	10
11	3	40	0,000	1,875	1,040	4	18,000		60	684,000	378,000	25	50
12	12	48	68,500	180,000	9,748	14	154,973			6,403,026	2,404,000	150	42
13	1	3	2,500	15,000	300		420		70	20,000			25
14	5	52	20,000	575	720	6	5,000		75	20,000	10,000	60	
	79	481	585.000	1,368,310	67,696	110	1,020,010	125,000	72¼	42,236,506	11,807,000		

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The Breweries.

The breweries of the State show a considerable and almost universal increase in business for the year, there being but two exceptions among the 15 reporting. This, with that of malting, is destined to become one of the most important industries of the state, the barley raised in Montana having a world-wide reputation for its unequaled qualities for malt and beer making.

REPORT OF BREWERIES FOR 1898.

Trading Number.	Number of employes	Weeks Brewery in operation during year	Amount invested in business.	Business done during the year.	Amount paid for Labor during year	Amount of Montana Barley used Bushels.	Amount of Barley imported. Bushels	Amount of Malt made Bushels	Amount of Malt imported. Bushels	Price of Barley Bush.	Value of Malt Bush.	Weight of Barley Bush.	Barrels of Beer made.	Value	Condition of business as compared with 1897. Increase Per cent.	Decrease Per cent.
1	40	52	$425,000	$300,000	$65,000 00	60,829	10,000	73,733	.....	65	68	52	38,775	$155,100	15	.....
2	12	52	60,000	60,000	17,000 00	10,000	.....	10,000	.....	60	125	48	5,000	30,000	10	.....
3	8	52	40,000	76,000	7,488 00	10,000	.....	5,240	.....	60	70	.....	5,320	42,560	.....	.....
4	24	52	100,000	114,440	15,678 35	.....	.....	12,000	6,800	.....	117	.....	11,222	78,554	10	.....
5	14	52	85,000	83,922	14,345 90	.....	.....	.....	13,300	.....	60	.....	11,480	50,000	25	.....
6	20	52	120,000	117,963	14,630 70	.....	.....	.....	20,000	.....	95	.....	13,107	78,642	20	.....
7	9	52	50,000	60,000	3,680 00	25,000	.....	.....	25,000	57	70	.....	5,300	13,000	15	.....
8	7	52	37,000	60,000	6,400 00	.....	.....	2,100	6,200	.....	82	.....	8,000	32,000	20	.....
9	7	52	35,000	25,000	5,400 00	5,500	.....	5,000	.....	55	50	50	2,300	11,500	25	.....
10	4	52	15,000	14,000	2,500 00	2,000	.....	1,500	.....	65	90	50	573	5,750	.....	.....
11	3	52	9,000	4,500	1,700 00	1,500	.....	1,500	.....	.....	.....	.....	500	4,500	.....	25
12	2	52	30,000	8,900	2,000 00	1,000	.....	1,000	.....	1.00	70	52	500	4,000	Same	.....
13	1	52	5,000	4,000	1,000 00	600	.....	600	.....	60	1.00	50	300	3,000	.....	.....
14	3	52	10,000	3,500	2,100 00	.....	.....	.....	1,400	.....	1.15	34	430	3,870	5	.....
15	32	52	250,000	135,000	20,000 00	40,000	.....	36,000	.....	62½	65	.....	16,000	135,000	5	.....
	189	.....	$1,271,000	$1,066,325	$178,923 01	156,429	10,000	148,673	72,700	.....	.....	.....	118,807	$647,476	.....	.....

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The Brick Yards.

The brick industry of the state does not appear to have experienced any increase of business over the preceding year, except in seve where it was reported as being "somewhat better," and in one an increase of 10 per cent. The volume of business for the year was $271,807, and in producing this 274 men were employed.

REPORT OF BRICK YARDS FOR 1898.

Tracing Number	Amount Invested in the business.	Amount of Business done.	Amount paid for Labor.	Number of Common Bricks made.	Value	Number of Pressed Bricks made	Value	Number Fire Bricks made.	Value	Number Feet Sewer Pipe made.	Value	Number Employees.	p
1	$40,000	$24,025	$5,000 00	3,700,000	$21,275 00	20,000	$25,000	.....	.....	10,000	$2,500 00	41	
2	10,000	15,000	8,000 00	3,000,000	16,500 00	.....	.....	.....	.....	.....	.....	27	13
3	5,000	2,000	2,000 00	650,000	3,087 50	.....	.....	.....	.....	.....	.....	17	2
4	2,500	6,650	3,500 00	1,330,000	6,650 00	.....	.....	.....	.....	.....	.....	7	.....
5	2,000	11,250	5,250 00	1,400,000	10,150 00	100,000	1 100	.....	.....	.....	.....	16	20
6	50,000	128,015	58,812 94	1,677,800	12,583 50	18,000	270	1,616,632	61,432	.....	.....	52	52
7	150,000	11,667	10,086 64	850,000	5,950 00	1,200,000	16,400	.....	.....	.....	.....	23	30
8	2,000	9,000	1,850 00	200,000	1,400 00	.....	.....	.....	.....	.....	.....	5	10
9	2,500	4,000	1,000 00	475,000	3,325 00	.....	.....	.....	.....	.....	.....	.....	8
10	1,300	2,300	1,500 00	383,000	2,298 00	.....	.....	.....	.....	.....	.....	20	16
11	4,000	5,000	3,000 00	900,000	7,200 00	.....	.....	.....	.....	.....	.....	8	16
12	600	1,000	400 00	100,000	900 00	.....	.....	.....	.....	.....	.....	.....	6
13	10,000	25,000	2,000 00	230,000	1,955 00	.....	.....	.....	.....	.....	.....	3	52
14	1,000	1,600	900 00	160,000	1,600 00	.....	.....	.....	.....	.....	.....	7	8
15	4,000	5,000	2,200 00	900,000	.....	.....	.....	.....	.....	.....	.....	9	14
16	50,000	No business in 1898		.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
17	1,000	300	450 00	.....	.....	.....	.....	.....	.....	.....	.....	.....	9
18	25 000	20,000	12,000 00	1,800 000	11,700 00	32,000	512	30,000	1,050	45,653	6,173 92	39	40
...	$3,609,000	$271,807	$118,549 56	17,755,800	$106,574 00	1,370,000	$18,532	1,646,632	$62,480	55,653	$8,673 92	274	.....

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rangers and supervisors. Not

Montana Forest Reserve

these reserves since the

ed for by the effi-

If the recommendations of Secretary of the Interior Cornelius ld men approved by congress, the boundary line of the Yellowstone National Park extended to include 3,350 miles now outside its borders. The secretary indors the bill that was drafted a year ago, providing for the extension of the park. The boundaries, as suggested in the bill, would extend the limits of the park so as to embrace the Yellowstone timber land reserve, which lies on the east and south boundaries of the park, and comprises 1,914 square miles; all that portion of the Teton forest reserve lying east of the summit of the Teton range and comprising 1,050 square miles, and adjoins the Yellowstone timber land reserve on the south; together with an unreserved area of about 30 square miles at the southwest corner of the park in Idaho, and an unreserved area of about 260 square miles at the northwest corner in Montana. These forest reserves are fine bodies of timber which it is important should be preserved from fires because of its value as timber, as well as the protection to watersheds and against fires running into the park.

On the act authorizing the establishment of the forest preserves and the intention and purpose of its authors, and the good that is accruing from it, we have the following interesting summary from Hon. J. B. Collins, superintendent of the United States Forest Reserves of Montana:

On March 3, 1891, Congress passed an act granting authority to the President to set aside as a public reservation, public lands being forests, wholly or in part covered with timber, and on Feb. 22, 1897, President Cleveland by proclamation established thirteen forest reservations containing an aggregate area of 21,379,840 acres, or about 33,400 square miles.

This proclamation met with such decided opposition, particularly from members of congress from the northwest and western states, on account of its provisions not being sufficiently understood, that President McKinley held it in abeyance for one year, so, in fact, the act really became operative only on March 1, 1898.

In Montana there are three established forest reserves having an aggregate area of 4,999,680 acres, divided as follows:

The Flathead, containing 1,382,400 acres; the Lewis and Clarke, containing 2,926,090 acres, and that portion of the Bitter Root reserve in Montana containing 691,200 acres.

The exact boundary of these reserves cannot now be given, as but a portion has been surveyed. Their location can best be described as follows: The Flathead reserve embraces an area in the northeast portion of Flathead county and the northwest portion of Teton county, extending to the Blackfeet Indian Reservation on the east, and north of the Great Northern railway to British Columbia. The Lewis and Clarke reserve embraces an area in the southeast portion of Flathead county, the northeast portion of Missoula county, the northern portions of Deer Lodge and Lewis and Clarke counties, and the western portion of Teton county. The Bitter Root reserve in Montana embraces the entire western portion of Ravalli county.

The object of forest reservation is best explained by citing the circular of June 30, 1897, issued by the Department of the Interior, General Land office, as follows: "Public forest reservations are established to protect and improve the forests for the purpose of securing a permanent supply of timber for the people and insuring conditions favorable to continuous water flow. It is the intention to exclude from these reservations, as far as possible, lands that are more valuable for the mineral therein or for agriculture than for forest purposes, and where such

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... a reservation they may be restored to ... with the geography or topography of the ... reserves established in Montana embraces the ... state. The object, as already stated, is to protect these for- ... means to lock them up and prevent bona fide settlers, miners ... om obtaining matured timber. Such is not the intention; on the ..., it is necessary for the preservation of the forests that the matured timber should be cut, but cut under proper regulations and in a systematic, regular manner, Parties desiring to cut timber should make application to the Honorable Secretary of the Interior for permission, and upon their complying with prescribed regulations, permit will be granted. Indiscriminate cutting of timber will soon devastate our forests; judicious cutting will preserve them. The forest cover, as is well known, affords a natural water shed. This supplies the many streams heading in the forests that in turn furnish water and moisture to the valleys and lowlands below. A natural, gradual flow of water from the forest cover to the lands below is regulated in a very large measure by the forest itself. Remove the forests and this gradual and natural flow of water would cease and in the spring and early summer the melted snows and heavy rainfalls would create floods that would prove most disastrous to the valleys and tributary lowlands. Again, a certain amount of humidity is essential not only to vegetable and animal life, but conducive in a great degree to the betterment of human life. Our forests create humidity and disseminate it in proper proportions and in a natural, consistent manner. Their influence is wide and far reaching. The removal of our forests would very materially change all this. A dry, parched and arid locality would obtain, and all verdure as well as all life would feel the baneful conditions. Hence any careful observer can not help but discern the very great advantages arising from the preservation of our forests. The subject is an exhaustive one. Space at this time will not admit of as full a treatment of the same as the writer could wish. Just a few words in conclusion as to the manner our forest reserve force is attempting to carry out the provisions of the act.

Over the three reserves in Montana a superintendent is appointed, and to each reserve is assigned a supervisor and a number of forest rangers. At this writing there are in the Flathead reserve nine rangers, in the Lewis and Clarke seven, and in the Bitter Root nine. These rangers form a chain of patrol around each reserve, having headquarters at some designated point. They regularly patrol the territory assigned them, watching carefully the various trails, canyons and other means of entry into the reserve, and keeping an eye upon all who enter the same. This is done to prevent the starting or spread of forest fires, which annually do so much damage to our forests. Each ranger is mounted and daily patrols certain prescribed districts. He renders a weekly report to the supervisor of his reserve and one to the department, showing exactly what his daily work has been. The supervisor renders weekly to the department and to the superintendent a summary of the daily work done by themselves and by the rangers under them, and the superintendent renders a report regularly each week to the departmnt of his work and of the force under him. A perfect and complete system of communication between each ranger and each supervisor, and between each supervisor and the superintendent, and between the superintendent and the department is in vogue. Thus each day's work performed by each reserve office is known in the department at Washington and a record kept of the same.

The force in Montana was not in the field until August, 1898, and up to this time, Nov. 26, 1898, have succeeded in extinguishing some fifty or sixty fires that had started on the outside of the reserve, and that might have communicated to

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same but for the watchful care and vigilance of the rangers and supervisors. Not a single fire has occurred within the limits of any one of these reserves since the force was in the field. The writer believes this can be accounted for by the efficiency, the vigilance and the activity of the supervisors and rangers.

As the danger from fire is practically over for this season, our force of field men are engaged in cutting new trails through the different reserves, in clearing out old ones, and in clearing the reserves, as far as possible, of all rubbbish, debris, etc., that has accumulated, and destroying the same, thus as far as may be reducing the danger from fires another season to a minimum.

The Public Schools.

State Superintendent of Public Instruction Carleton has made an exhaustive report of the public schools of the state, showing that Montana spends more per capita to educate her children than do any of the older states, and that the progress and standard of education here is high.

During the past two years the public schools of the state, as a whole, have made marked improvement, as any one in touch with the work for this period can testify. As we said in our annual report for 1897, "We have more school houses, more pupils and more teachers than ever before; and, it may be added, we have more good schools and more competent teachers than we ever had in the history of the state."

From the tables which are made a part of this report, we see that there are 669 school districts in the state, an increase of 99 since 1896; that the number of census children is 49,478, an increase of 7,260 over 1896, and an increase 3,299 over 1897; that the enrollment for 1898 is 35,070, being the remarkable increase of 7,159 over 1896, and an increase of 4,634 over 1897; 1,086 teachers have been employed during the year 1898, while but 953 were employed in 1896. That $575,332.04 was apportioned to the 669 school districts of the state, as against $381,893.46 for 1896, being an increase of $193,438.58 in two years. In 1896 there were 10,197 volumes in school district libraries; in 1898 there are 16,474, making an increase of 6,277 volumes.

A study of these figures, as well as the other data contained in this report, shows how great has been the increase in everything pertaining to our public schools. Not only have all of our school interests greatly increased in the past two years, but these same interests are now increasing at a very rapid rate.

The Territory of Montana was created by act of Congress May 26, 1864, but the first report of this department, on file in this office, is that of the Hon. T. F. Campbell, Territorial Superintendent of Public Instruction, for the year ending Nov. 30, 1868, and contains merely incomplete data of the counties of Madison, Gallatin, Deer Lodge, Lewis and Clarke and Meagher. There is no report of Jefferson, Choteau, Missoula and Beaverhead for the year. The data contained in this report is so incomplete that it is of little value.

The first regular report of this department is that of the Hon. Cornelius Hedges, Superintendent of Public Instruction, for the years 1872-3. This report gives quite full data of the nine counties above named. By reference to the comparative table of statistics we see how great and steady has been the increase in the number of pupils in the state, and the consequent increase in the number of teachers, school houses, and, in short, in everything that pertains to public education.

In 1868 there were, approximately, 2,000 children of school age, taught by about 40 teachers. To-day we have 49,478 children of school age, taught by 1,086

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teachers. The public schools of Montana have grown and developed as the state has increased in population and in material wealth. Our people have ever taken a just pride in their free public schools, and have been most liberal in voting the money necessary to maintain an excellent system.

We are just beginning to appreciate the School Income Fund, and to realize the growing importance of it to the common schools. Since the organization of Montana as a Territory, our people have most generously supported the public schools by a direct tax. While the amount of the state appropriation is not yet large, it will constantly increase, and should become at no distant day sufficiently large to relieve the people to an appreciable extent of a portion of the burden they now carry to maintain their common schools.

Under the law, the State Superintendent apportions between the 1st and 10th days of February the State School Fund to the different counties in proportion to the number of census children.

But three state appropriations have been made. The first in 1896, amounted to $51,027.60; the second, in 1897, to $17,731.56, and the last, that of 1898, to $28,630.98. It is estimated that the state appropriation for 1899 will be about $50,000, or approximately one dollar to each census child.

The first appropriation was much larger by reason of the fact that the fund had been accumulating in the hands of the State Treasurer for some five or six years, and, there being no law authorizing its distribution, it was held in the state treasury, drawing no interest to the benefit of the state. After the law was enacted authorizing its distribution, the accumulated fund was apportioned. This fund is made up of the interest on all invested school funds of the state, and all rents accruing from the leasing of school lands.

During the past school year 35,070 pupils attended the public schools some portion of the year. There was expended for school purposes during this time almost a million of dollars, or, to be exact, $993,607.66. The per capita cost of the schools for the whole state is $28.33, while the per capita cost of the United States is only $18.57. It costs Montana, approximately, $10 per capita more for her schools than the average cost for the country, and that, too, when our schools are in session only a little over five months in the year on the average, while the average length of the term for the whole United States is a trifle over seven months a year. When we consider the great number of districts with less than twenty pupils attending school, or even the great number where less than a dozen attend, we can understand the enormous expense of maintaining schools under such conditions, and why our per capita cost of education is so much greater than the average for the United States.

The state has had a local option free text book law for the past two years, and it has been adopted by a number of districts and will soon be universal. It is estimated that one-third of the pupils attending the public school now have their books furnished free under this law.

It may be proper, however, to here say that Montana may well be proud of all of her state schools. Though they have been but recently established they are doing a noble work for the state, and are entitled to much credit for the splendid showing they make in so short a time. There is now no longer any excuse for sending our boys and girls out of the state to complete their education.

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COUNTIES OF THE STATE.

Their Area, Resources, Transportation Facilities, Topography, Development, Adxantages and Opportunities.

Following is given a concise statement of the principal features and advantages of the several counties of the state, the publication being made with a view to acquainting those who may be in quest of a new and advantageous permanent location, with the more prominent natural and acquired resources and the opportunities that are offered by each locality, the information given being uncolored with the optimistic interests of personal concern and reliable in every detail.

To aid in conveying a correct impression, a map is given of each county, allowing the reader to locate the detail of the descriptive matter, the maps plainly showing the location of the rivers, valleys and mountains; the railways, county seats, towns and cities, and the exact boundaries of each county. Generally speaking, these maps are absolutely correct, but their scale can only be applied with surety in districts where the lands have been surveyed. For unsurveyed portions, the maps are as nearly correct as could be made with the data obtainable.

Beaverhead County.

Beaverhead is one of the oldest settled counties in the state and has an area 4,600 square miles. The greater part of the county is covered by mountains and foothills. The mountains are covered with a heavy growth of timber and the foothills afford excellent pasturage. The county is well watered. The principal streams are the Beaverhead, Big Hole, Red Rock and Blacktail, and their tributaries. It is along these streams that the fertile valleys lie. The soil in these valleys is a sandy loam, from one to eight feet deep. Farming and stock raising are the principal resources of the county, aside from mining. There were 191,592 acres of land assessed in Beaverhead county in 1898. All lands require irrigation for cultivation. There are still some public lands in the upper Big Hole district, and on some of the other valleys where water can be diverted, but most of the land of this character has been taken up. There are some excellent locations for reservoirs and canals where considerable areas of fertile lands can be supplied with water. In most cases the cost of building these reservoirs and canals is beyond the reach of individual settlers, and they can only be built by co-operative or public effort. Improved lands with water rights can be purchased for from $12 to $75 per acre. The tillable valleys in Beaverhead are generally narrow, but grazing lands on the public domain is convenient to most of the farming districts, and many farmers are adding flocks of sheep and herds of cattle to their possessions. The principal crops grown are oats, barley, potatoes, timothy and alfalfa. Owing

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to the altitude, only the smaller fruits are grown. A market for the surplus product is found in the mining districts of Butte and Anaconda. The first settlers were the gold miners, who discovered rich placer diggings at Bannack, which was the first capital of Montana. There are large mineral areas in this county, but in only a few places has sufficient work been done to develop paying properties. The minerals produced are gold, silver, copper and lead. The mines and reduction works of the Hecla Consolidated Mining Company are located at Glendale, near Melrose. Much attention has lately been given to placer mining by means of dredges, and it has proven successful in many instances. The estimated population of the county is 5,000. The various religious denominations have organizations, and excellent public schools are provided for the education of the children, $18,024.81 having been expended for school maintenance in 1897.

Dillon, the county seat, has a population of 1,500, and is pleasantly situated in the fertile valley of the Beaverhead river, on the line of the Utah & Northern railway, some 328 miles north of Ogden and 80 miles south of Butte. There are ample school accommodations for the education of the children, and there are five churches in the city. The Masons, Knights of Pythias, Ancient Order of United Workmen, and other fraternal and beneficiary orders maintain lodges here. The city is lighted by electricity. The State Normal School is located at Dillon, and is in a very prosperous condition, and promises much for the future. The purpose of this institution is to prepare the teachers of the state for their great work. The first annual report for the year ending June 17, 1898, gives the attendance at 140. This school is supplied with a fine library and the necessary apparatus for carrying out the purpose for which the school was created. The Dillon Fair and Racing association holds an annual fair at Dillon.

There are 2,155,759 acres of unsurveyed lands, 499,930 acres of unsurveyed lands unappropriated, 2,800 acres of land reserved, and 320,511 acres of land appropriated, in Beaverhead county. There are 76 miles of railroad in the county, which furnish easy communication with markets east and west. The people are prosperous and enjoy every social advantage.

Broadwater County.

Broadwater county was organized March 1, 1897, from parts of Meagher, Jefferson and Lewis and Clarke counties, and was named in honor of Col. C. A. Broadwater, a public-spirited and progressive business man of Helena, to whom the state is indebted for much of its present development and prosperity. The county contains about 975 square miles and its industries are diversified. Farming and stock raising are very profitable in the valleys, and the mining camps at Radersburg, Winston, Hassel and St. Louis furnish employment to many men and are among the wealth-producing camps of the state. The principal agricultural valleys are the Missouri, with its tributaries. Crow creek valley on the south is a fine farming country. The soil in the valleys is generally a sandy loam from seven inches to several feet in depth, and produces abundantly all the grasses, grains, vegetables and root crops. The agricultural production in the valleys is limited, but with better railroad facilities and the present revival of the mining industry, will be greatly increased. Small fruits are raised in all the farming districts, and the standard apples, plums and cherries are grown in the Missouri valley. Large quantities of hay are raised and furnishes the winter supply for feeding the stock that grazes on the pasture lands of the county. Good water

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is found at from 20 to 40 feet in depth. Timber for fuel and fencing grows on the mountain sides. The number of cattle assessed in the county was 8,349; the number of sheep 20,342, and the number of horses 5,374. There are two railroads in the county—the Northern Pacific having 42 miles, assessed at $214,710, or $5,100 per mile. The Montana railway has nearly two miles, and is assessed at $563.50. After running through but two miles of Broadwater county, the Montana railway traverses the northern part of Gallatin and again touches Broadwater at its southeast corner, providing transportation facilities for a considerable portion of the latter county. There are several water ditches already built and covering much of the farming land in the valleys, but there are still large areas that can be brought under cultivation by diverting conveniently abundant water to them.

Townsend, the county seat, is beautifully located on the Missouri river on the line of the Northern Pacific railroad, and has a population of 900 and is supplied with an electric lighting system. The town is surrounded by a fertile valley and is a progressive and growing place. There are public schools, churches, public buildings and everything pertaining to the comfort and happiness and prosperity of her people.

Improved lands can be had for from $20 to $75 per acre, according to the nature and quality of the improvements and the state of cultivation. The total area of the county is 2,979,000 acres, and the assessed acreage is 189,836 acres. Beside the county seat, there are five other growing villages—Canton, Hassel, Radersburg, Toston and Winston.

Carbon County.

Carbon county was created by an act of the legislature in 1895, from portions of Park and Yellowstone counties. The area of the county is 3,000 square miles, and is composed of agricultural, grazing and mountainous lands. The population is estimated at 5,000, of which more than 1,000 are miners engaged in the development and working of the coal and quartz mines of the county. The industrial resources of the county are mining, farming and stock raising. The principal valleys are the Yellowstone, Clark's Fork, Stillwater, Rocky Fork, Rosebud and tributaries. All lands require irrigation for cultivation. There are 44 miles of the Rocky Fork and Cooke City branch of the Northern Pacific railway in the county. The facilities for combined farming and stock raising are unusually good.

Red Lodge, the county seat, is located on the Rocky Fork river at the base of the mountains, and is the terminal of the railroad and a shipping point of some considerable importance, being the outlet for the sheep and cattle ranges of a part of northern Wyoming. It has a population of 1,500, with good schools.

Not in all the broad domain of the "Treasure State of Montana" are the natural resources more fittingly adapted for the agriculturist or stock grower than are those within the boundaries of Carbon county. The numerous small streams flowing down its fertile valleys furnish an abundant supply of water for irrigation not surpassed by any other agricultural section of the state. Along Rock creek the stream makes a descent of about 100 feet to the mile, and the numerous irrigation ditches along its course attest the fact that nearly all the bench lands stretching for several miles back from each side of the Rock creek valley proper can be brought under cultivation and made to produce wonderful crops with but little labor. The Clark's Fork and Stillwater rivers, with their tributaries, do not

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fall quite as rapidly as Rock creek, yet inexpensive irrigating ditches and canals are met with on every hand, and much of the rich soil of these valleys is being brought to a high state of cultivation. Statistics have shown that the most populous and prosperous regions of the earth are those in which irrigation is practiced. The natural advantages of Carbon county in this respect will show that she is destined at no distant day to have no superior in the state. In Carbon county the yield of wheat is from 35 to 50 bushels per acre. As the demand for breadstuffs within the state much more than equals the supply, the producer of these staples does not have to pay large transportation charges to get his product to a market. In years past the hills and valleys of what now comprises the county of Carbon were monopolized by large herds of cattle and sheep, but since the valleys have been settled upon and the streams fenced in to a large extent, the great herds have been reduced until now the stock is almost entirely owned by the smaller holders and ranchmen. The hills and grazing lands back from the streams will always afford plenty of pasture lands for small herds of stock, and the rapid development of the coal mining industry provides a ready home market for products of both farm and range. Alfalfa, staple fodder for cattle, sheep or hogs, is being raised by nearly every ranchman in the county. The yield for a season is from three to five tons to the acre. Barley, equal in every respect to the noted product of the Gallatin valley, is grown here and finds a ready sale in the eastern states, to be used for malting purposes. Oats yield from 60 to 80 bushels per acre, and bring from 75 to 125 per hundred pounds. Corn, vegetables and small fruits all grow splendidly in any of the valleys and command good prices.

However much Carbon county may be blessed with agricultural and stock growing resources, the fact must not be lost sight of that her coal mining industry is one of the chief institutions of the state. Outside of the high mounains in the southwest corner, the entire county is underlaid with measures of semi-bituminous coal. At Red Lodge and the Rocky Fork, mines have been operated extensively since 1889, and the coal is being used on railroads, in smelters, mills, and for domestic purposes from the Missouri river at Mandan, North Dakota, to the Washington state line. These mines employ from 300 to 500 men and indirectly support as many more. At Carbonado, about 20 miles northeast of Red Lodge, the Anaconda Copper Mining company is erecting a coal mining plant that will be the equal of any in the west. This company will use the coal at their smelters at Anaconda and will employ in the coal mines from 1,000 to 2,000 men. At Bridger, the coal measures have been developed and a mining plant erected by Butte mine owners and others which will soon be shipping from 150,000 to 250,000 tons of coal a year. At Gebo, a company has been at work putting in a coal mining plant that will have an equal capacity. A railroad to these two points has just been completed and the mines will soon be in active operation. Other smaller companies are operating coal mines within the county, and it is safe to estimate that from 5,000 to 10,000 men will eventually be employed in Carbon county in this single industry. South and southwest of the railroad shipping points of Carbon county are the quartz mining districts of Sunlight, Wood River, Stinking Water, Grey Bull and New World. From the former district rich silver and copper ores are being mined and freighted to Red Lodge for shipment to smelters. In the Wood River district arrangements are being made by one of the mine owners for keeping 30 freighting teams at work hauling ore from one of the mines during the coming year. In the New World district a 10-stamp mill and concentrator is in successful operation. At no distant day smelters will be constructed in the vicinity of the coal measures and these ores will then be treated without

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incurring the expense of transportation charges. Near the headwaters of Butcher's creek, about 15 miles west of Red Lodge, are petroleum fields, where crude petroleum oozes out of the sandstone. During the past fall a diamond drill was operated here and at a depth of 250 feet a fine quality of oil was reached, which rose up over 40 feet in the well. A larger drill has been ordered for permanent use here and soon another great industry will be added to Carbon county's wealth. Along the base of the Bear Tooth range of mountains, in the southwestern corner of the county, are immense reefs of the finest quality of limestone, from which a great deal of lime has been manufactured and is being used almost exclusively in the towns of southeastern Montana. Along the Clarke's Fork river placer gold has been mined for a number of years past. The gravel bars along the river yield on an average 30 cents to the cubic yard. Miners and teams and scrapers have been making fair wages mining this gold for several seasons. Near the new town of Bridger a plaster of paris mill has been operated for several years past and the product shipped to all points of the state. The quality of the cement is of the best and the gypsum deposit, from which it is manufactured, is practically inexhaustible. Iron ore also abounds in the mountains and will become valuable for smelting and manufacturing purposes. Immense sulphur deposits and mountains of the purest marble are situated on some of the tributary streams of Clarke's Fork river.

Educational and social advantages are of the best. Progressive and prosperous towns are building up rapidly and in no section of the west are the future prospects of thrift and plenty better than in this section of the state. Not one-half of the agricultural land of the state has been settled upon, and as there are practically no railroad lands within its boundaries, all that is yet vacant is open to homestead or other entry. It is true that along the streams the bottom lands have been taken, but there are yet many excellent farms that may be secured on the benches and in the smaller basins.

Cascade County.

Cascade county, with a population of 20,000 and an assessed valuation of over $13,000,000, lies in the central part of the state and has an area of more than 3,000 square miles. It consists of valleys, bench lands, foothills and mountains. The principal valleys are the Missouri, Smith, Sun rivers, the Muddy and their tributaries. These valleys are separated by fertile bench lands, which extend on the south and east to the Belt and Highwood ranges of mountains. The elevation of the principal valleys ranges from 3,400 to 4,000 feet. The soil of Cascade county is varied in character, consisting of a rich alluvial deposit in the valleys, and a warm, sandy loam, with clay sub-soil, on the uplands. In the valleys irrigation is found advisable and insures a good crop every year. Settlers in the Sun river valley who have irrigated their farms for over eighteen years report that during this period there has not been a single crop failure. On the bench lands farming is successfully carried on without irrigation, and the warmth and great fertility of the soil, the proximity to the timber of the mountains, and the abundance of pure water render these lands especially desirable to the settler. All cereals do well and the wheat, barley and oats grown are of exceptionally fine quality. Root crops are grown in abundance and are known for their excellence.

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Timothy and alfalfa are grown and some varieties of apples grow in sheltered localities. There are unsually fine ranges for stock near the farms, and dairying and stock raising can be easily and is successfully combined with farming. It is estimated that there are fifteen hundred square miles of arable lands in the county not yet irrigated, and now chiefly used for grazing purposes, but a greater portion of which is open for settlement, and there are large areas of bench lands on which water can be diverted from the streams through large ditches. There are some irrigating canals already completed and others in course of construction. Springs are numerous, and one, the Giant spring, at Great Falls, has gained an international reputation. This spring rises from a low bank of the Missouri and its abundant crystal waters flow directly into the river, which is not more than 100 feet distant. Analysis shows the water of this spring to be artesian. Good water in wells is obtained at a depth of from 15 to 25 feet almost anywhere in the county. The average cost of lumber is $14 to $25 per thousand, and of brick $8 per thousand.

There are numerous schools and churches in every part of the county.

Added to the advantages surrounding Great Falls that have been mentioned, there is a bench that extends from northeast of the city west along the north side of the Sun river to the foothills of the Rocky Mountains that embraces the finest agricultural district of the state, and arrangements are now being perfected for the state to irrigate 125,000 acres of these lands—a tract that when placed under cultivation will pour out a flood of agricultural wealth that in making Great Falls its market and milling point will prove a very considerable factor in pushing that city on to its destined greatness.

There are 20 miles of the Great Falls and Canada railway, and 169 miles of the Great Northern railroad and branches in the county, assessed at $873,795.

The mineral resources of this county are very great. There are vast coal fields at Armington, Deep Creek, Stockett, Sand Coulee and Belt, the three last being worked on an extensive scale, employing over 2,000 men, the output from the different mines exceeding five thousand tons per day. The silver and lead mines at Neihart and Barker are extensive and rich, and are considered by some the largest silver deposits on this continent. Many of the mines are being worked profitably, even at the present low price of silver. Prospectors during December struck a lead on the "Wrong Side of Baldy" that, while carrying hundreds of ounces in silver, will yield enough gold as a by-product to pay for working the property. Deposits of iron, gypsum, lime rock, fire clay and almost every variety of sandstone are found in this county. In fact, its mineral deposits are in wonderful variety and abundance.

Great Falls, the county seat, is the third largest city in Montana, and has a population of over 12,000. It is situated at the falls of the Missouri river, where the river makes a descent in a short distance of over 500 feet, and is estimated to be capable of furnishing more than 400,000 horse power, an economically available energy for manufacturing and other purposes unsurpassed, if equalled on the continent. A dam at Black Eagle Falls has developed 50,000 horse power and 250,000 additional horse power can be obtained at a minimum of expense. Great Falls has already in operation great copper and silver smelting and refining plants, costing millions of dollars and employing thousands of men in them and attendant industries. Sawmills, flouring mills, foundry and machine shops and other large employing enterprises contribute to the city's prosperity, and she has all the contributory resources and advantages to make her the future great commercial and manufacturing city of the state. The railroad facilities are of the best, with promise of additional lines in the near future. It is also one of the largest initial wool

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markets of the country, over eight million pounds of wool having been sold there during the past season. This season the Montana Brewing company has established a large and modern malting plant, and as the agricultural portions of the county produce the finest malting barley in the world, the production of malt for export will soon figure as an important industry.

The public schools of Great Falls are of the highest order, $143,000 having been spent on the schools during the last year. The Central High School building is perhaps the finest educational building in the state—a massive, light-colored stone structure of elegant appearance, provided with the most modern educational facilities and accommodations for about 700 pupils. The various religious denominations have organizations in Great Falls, and the different fraternal and beneficial orders maintain lodges.

The city has taken a great step in advance in deciding by a vote of the people to purchase the system of water works and place them under municipal operation and control. The city is lighted by electricity and has ample street car facilities. The North Montana Fair association holds an annual fair at Great Falls, and on these occasions the agricultural, horticultural and stock exhibitions will easily equal those of the middle states.

The other prosperous towns in the county are Belt, with a population of 1,600; Sand Coulee, with a population of 600; Stockett, 300; Barker, 250, and Neihart, with 1,000. These towns derive their support from the coal and silver mines adjacent. Cascade is a thriving town of 300 people, in the southwestern part of the county, and is surrounded by a rich farming and stock country.

Cascade county has great and diversified resources, and the peculiar advantages enjoyed by the city of Great Falls, the large area of fertile farming lands surrounding her, the vast deposits of coal, iron, silver, lead, gypsum and fire clay found near, and a practically inexhaustible water power, insure to her commercial supremacy in the state.

Of the Electric City of Montana, the Business Men's Association says:

Location—At falls of the Missouri, base of Rocky Mountains.

Population—In 1885, 350; in 1890, 3,900; in 1897, 13,500.

Water Power—Height of falls and rapids, 512 feet. Available in low water, 350,000 horse-power, 25,000 horse-power already developed. Can be improved at less cost than any other in the United States.

Electricity—Generated at water power and used throughout the city.

Coal—Unlimited supply in immediate vicinity. Present output 5,000 tons daily. 100 coke ovens constantly employed.

Leading Industries—Smelting ores, electric refining of metals, and flour making.

Mineral Tributaries—Gold, silver, copper, iron and lead ores, also aluminum and terra cotta clays, silica, lime, gypsum, fire-clay, hydraulic cement, mineral paints, etc.

Other Tributaries—Rich agricultural and grazing lands.

Mercantile Interests—Is the largest trade center in Montana.

Farm Products—Wheat, oats, barley, hay, vegetables, etc.

Value of Yearly Manufactured Articles—$8,500,000.

Wool—7,000,000 pounds marketed here in 1897.

Pay Roll—$265,000 monthly.

Railway Tonnage—Ranks second between Minneapolis and Pacific Ocean.

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School System—Equal to the best.

Water Supply—Pure; from granite mountains.

Altitude—3,300 feet.

Climate—Unexcelled.

Objects of Interest—Falls of the Missouri, Giant Fountain, Canyons of the Missouri and Belt Rivers.

Hotel Accommodations—Excellent.

Its future—It will be the largest city in the Northwest. Visit it and judge for yourself.

Choteau County.

Choteau county covers an area of 14,835 square miles, besides the Fort Assinnaboine military and Fort Belknap Indian reservations. It is named in honor of Pierre Choteau, a noted explorer and trader. Choteau county has a population of 5,000, and the number is being gradually increased by settlement of the agricultural lands. It is composed of valleys and undulating uplands, with the Bear Paw mountains rising near the center and the Sweet Grass hills in the northwest. This county is well watered by the numerous rivers and streams that flow through it. The principal river is the Missouri, and the streams the Marais, Milk river, Teton and their tributaries. Wide and fertile valleys lie along these streams. The soil varies from a sandy black loam on the uplands and near the mountains to a still clay soil in the bottoms, the depth of which ranges from a few inches to four or five feeet. Irrigation is necessary to cultivation of the soil and so far water has only been diverted on a small portion of the land, but the soil is naturally very productive. The farm areas range from 2,500 to 5,000 feet elevation. Wheat, oats, barley, rye, and all the grasses and root crops do exceedingly well and in some places corn is raised. Fairly improved farms with water rights sell for $10 per acre and upward. Lumber sells from $10 to $20 per thousand. Water is obtained at a depth of from 10 to 40 feet. There are two large irrigating canals in this county, but all the lands covered have been disposed of. There is yet abundance of unappropriated water. Good inducements are offered to settlers where irrigated farms can be secured and operated in connection with stock growing. But stock growing is the principal industry in the county. The larger part of the county is grazing land, and more than 150,000 head of cattle and more than half a million sheep range and fatten on the rich and nutritious grasses that cover the uplands.

There are some gold mining claims on the Sweet Grass hills, but they have not been sufficiently developed to determine their value.

Fort Benton, the county seat, is situated on the line of the Great Northern railway and is at the head of navigation on the Missouri river. Before the advent of the railroads in the state this was the great distributing point of Montana. It contains a population of 600, and has a municipal system of water works, good schools, churches, and the fraternal societies are well represented. The other principal towns in the county are Chinook, the center of the great sheep raising district, with a population of 500, and Havre, the junction of the Montana Central and the main line of the Great Northern railway, a growing and thriving town of 500. There are 272 miles of railway in the county, assessed at $1,252,258. The number of

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cattle assessed in the county is 78,660 and valued at $1,616,900, and the number of sheep 449,944, valued at $1,124,858.

While Choteau county does not present the diversified resources of some of the other counties of the state, its future is both promising and assured. Though little development work has been done in the Sweet Grass hills, enough has been done to prove the existence of rich gold and copper deposits and extensive measures of coal that equal the noted Lethbridge product. The gold mines of the Little Rockies are also showing up well. But much the larger part of the county's great area will always be devoted to stock grazing, and in this industry the county will always rank prominently. As will have been noted, the county now contains thousands of head of cattle, horses and sheep, but its ranges, with their abundance of nutritious grasses, will support many additional thousands, and those seeking locations for stock raising in any of its branches, should look over the opportunities offered by Choteau county. The county embraces the area of a good sized state, and its present population and assessed acreage show the opportunities open for those who may be seeking remunerative stock raising locations.

The county will always occupy a prominent position in the history of the state, as its county seat was during all the years of its territorial existence, the commercial center and distributing point for hundreds of miles north, west and south, all merchandise for this great area being brought to Benton, the head of navigation, with the now almost forgotten Missouri steamboat.

Custer County.

"That all the remaining portion of the Territory of Montana not included in the counties before named, be, and the same is hereby created a county to be known as Custer county."

Thus spake the legislature of 1872, and the real estate thus lumped off was a parallelogram 246 miles east and west, by 130 miles north and south, from which a "thumb" projected westward and south of the Yellowstone river, 100 miles east and west by 50 miles north and south, the whole comprising a magnificent principality of about 40,000 square miles. Since then Custer county has given to her younger sisters a considerable portion of her princely patrimony, but is still the largest county in the state, if not in the nation, her present landed estate being 26,580 square miles. Some idea of the immensity of this county may be obtained by comparing its area with that of some of the larger states. It is larger than West Virginia, more than two-thirds as large as Indiana, and nearly half as large as Illinois. The county was named in honor of General Custer, who fell in the historic battle with the Sioux in the battle of the Big Horn, in 1876, the field of battle being marked by the National Cemetery Military reservation in the center of the Crow Indian reservation, in the western part of the county.

The topography is varied but principally of a character adapted to agriculture and stock ranging, to each of which industries the well watered valleys are most desirable adjuncts, for though it is only on the extreme bottom lands, subject to yearly overflow, that agriculture can be safely undertaken without irrigation, and though the ranges take on a very parched and arid aspect in August, water is rarely so scarce that range stock cannot find a sufficient supply, and with reservoirs, all that is needed for irrigation can be kept in hand. The bad-land breaks are unsuited to the demands of a dense population, however well they may be

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adapted to the nomadic range stock, and as this formation is largely in evidence in the northern portion of the county, from the Yellowstone river east to the Dakota line, it is only at intervals that a location is found for the settler, but the present population of the county, estimated at 7,000, could safely be increased to three or four times that number without exhausting existing resources, to say nothing of the amplification of these resources possible with the help of science and capital.

Range stock interests having virtually taken possession of the county in its early years, the influences—as in every range stock country—were all against settlement, and though history is repeating itself in the gradual encroachment of the "nester" upon the range of the cattle baron, the statement so industriously circulated by stockmen, that "no one can make a living off of the land," still holds its own as a bugbear to settlement, notwithstanding the fact that from one boundary to the other the fair face of the county is dotted over with the homes of men who came here poor and are now rich. Of course it must be admitted that most of their accumulated wealth came from stock ranging in a small way, but the things one gets to eat at these ranches completely upsets the assertion that one cannot live off of the land. There is scarcely a rancher now who has not a little "truck patch," irrigated and producing the most succulent vegetables. It is not too much to say for Custer county that industry, energy and sobriety are as well repaid here as anywhere on the face of the globe.

As has been said, the large cattle interests are finding it harder and harder year after year, to preserve the occupancy of their vast ranges, and partly for this reason and partly because of the enormous demand for feeders to consume the accumulated corn crop of Nebraska, Iowa and Kansas in 1897, there was a marked reduction in the stock range census of Custer county this year, the falling off from 1897 being more than 50 per cent, but the evidence is not lacking that many of the large owners are going to look into the feeding business themselves. Alfalfa has proven so valuable as a forage plant and so prolific in yield, that there is a marked inclination toward enterprises that contemplate an alfalfa field of from 100 to 500 acres, commodious feeding sheds and a spacious but well fenced summer pasture for the accommodation of from 1,000 to 2,000 head of cattle to be made into early spring beef.

Of sheep, Custer county has this year 208,000, but good judges look for this figure to nearly double next year. The large area of unoccupied range, clothed with rich grass, is proving very inviting to those looking for sheep range.

Range horses, heretofore of too little value to warrant any mention, are now looking up. Custer county has 26,000 of them this year, and there will be several thousand more next year.

Though possibly not blessed in a larger degree than her sister counties of Montana, Custer county is enjoying a condition of content and satisfaction that is at least conducive of good citizenship.

The county is provided ample transportation facilities by the Northern Pacific, which traverses the northern part of the county, and the Burlington & Missouri, which runs through the western part of the county.

Miles City, a pleasantly located town of 2,000 people, is the county seat, and the principal shipping and trade center for the entire county. Fort Keogh, garrisoned by several companies of United States troops, is located two miles west. The State Reform School and the United States Land Office are also located at Miles City. The town is situated at the junction of the Yellowstone and Tongue rivers, at the head of a broad valley that is noted for its abundant and excellent agricultural

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and horticultural products, the output finding a ready and profitable market at home and at Helena, Butte, and other western railway towns.

Dawson County.

Dawson county was organized in 1882 and contains an area of 13,194 square miles, and a population of about 2,000. It lies in the angle formed by the convergence of the Yellowstone and Missouri rivers. The topography of the country was early recognized as being especially adapted to stock raising, and has the credit of receiving the highest price paid in the Chicago markets for range cattle. The vast ranges with their succulent grasses, and numerous valleys, sheltered from the storms by the many hills, makes an ideal range for stock of all kinds. For the first fifteen years of its existence, the large companies had the ranges well filled, but for the past several years smaller outfits have been locating in the country, and the small stock grower, who carries on diversified farming, will in the future be king in Dawson county. The numerous large and small valleys lie at a lower elevation, have a higher temperature than any other part of the state, are well watered by creeks and springs, and are capable of producing all the crops of hay, grain and fruits adapted to the latitude and altitude. Almost the entire farming lands require irrigation, but some bottom lands along the Yellowstone have been cultivated without, but with irrigation farming is very successfully carried on. The assessed valuation of the live stock in the county for 1898 is as follows:

Range horses	7,510	$ 82,610 00
Common horses	1,472	37,831 00
Beef cattle	7,411	222,250 00
Yearlings	1,650	23,154 00
Two-year-olds	1,700	25,228 00
Stock cattle	24,545	337,052 00
Cows	312	7,800 00
Sheep	123,956	309,913 00
Hogs	14	70 00
Total valuation		$1,045,908 00

The personal property and railroad assessment this year will advance the legal standing of the county from the eighth to the seventh class.

There are 430,092 acres of land assessed, the valuation being $151,234. Although this large amount of land is held by individuals and corporations, very little of it is devoted to agriculture. With proper irrigation facilities thousands of acres now unprofitable could be made productive and splendid markets found within easy reach. Irrigation is as yet in its infancy, but where tried splendid results have been obtained. The Yellowstone furnishes abundant water for that purpose and by the diversion of its waters large areas of land in the valley can be brought under contemplation. Oats have yielded as high as 50 bushels to the acre, while wheat, corn and barley are equal in yield to the best anywhere, and the lack of shipping facilities is the only reason why they are not more extensively raised. As an agricultural district, the lower Yellowstone valley is largely undeveloped. Enough settlers have been engaged for the past 10 years in crop raising for profit

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to demonstrate that it is no longer a theory, but a well established fact that the valley returns a far more bountiful yield, in proportion to the cost of production, than any of the so-called agricultural belt states. All the farming lands in the county have large and excellent stock ranges adjacent, and combined stock raising and farming is destined to be the basis of the future prosperity of the county. The Northern Pacific railroad has 63 miles of road in the county, which is assessed at $319,770. The Great Northern also skirts along the northern border of the county for a long distance. Improved lands with water rights are held at $20 to $30 per acre. Eleven school districts are established in the county, and all of the schools are in a prosperous condition, with every modern equipment requisite to the best methods of instruction. The affairs of the county are wisely and economically managed, and county warrants in all funds are at par. The tax levy for 1898 will be 21 mills.

Glendive is the county seat and has a population of over 1,000. A steel bridge spans the Yellowstone river, built by the county, to accommodate the increasing business with the county seat from the north side of the river. Wibaux is the great cattle shipping point of the county, more than 500 cars of beef cattle having been shipped from there this season. Tokna, Newlon and Sidney are flourishing settlements in the lower Yellowstone valley.

The population of the county is small, considering the large area, and there is room for many thousands of stockmen and ranchers. The residents of the county are prosperous in all pursuits, and with the social, religious and school facilities afforded, almost any person can find a home and location to please them.

Deer Lodge County.

The area of Deer Lodge county is 4,111 square miles. It derives its name from a conspicuous mound at Warm Springs, formed from the overflow of thermal springs. The spring formerly emitted steam from the apex, resembling a gigantic wigwam or lodge. Hence the early French traders gave it a name signifying "the deer lodge."

The principal valleys are the Deer Lodge, Hell Gate, Big Blackfoot and Nevada creek. The Deer Lodge valley is 35 miles long and averages five in width. Much of the land of this county is bench and grazing land, with 2,400 square miles of mountainous land, principally mineral and timbered. About 200 square miles of the arable lands are now irrigated and cultivated, nearly as much more can be irrigated and placed under cultivation. The greater part of the smaller streams have been diverted for irrigating, mining or other purposes, but by the storage system, for which the county is admirably adapted, the area of cultivable lands could be largely increased over the area that can be watered from the streams and rivers. The county is one of the first settled in the state, gold having been first discovered in this country on Gold creek by a Scotch halfbreed, and this discovery was made authentic in 1858 by the Granville Stuart party that prospected and panned gold near Pioneer, on Gold creek. The resources of the county are great and her industries are diversified. There are large areas of the finest timber land in the state, and a mineral belt running north and south through the county, which has been sufficiently prospected to prove the existence of gold, silver and copper bearing quartz leads, some

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of which have been considerably developed and have proven valuable. There are extensive deposits of iron, coal, marble and fire clay in the county. The best fire clay and largest pressed brick works in the state are at Blossburg and Anaconda.

Combined farming and stock raising is an important industry in all the valleys. The principal agricultural products are hay, wheat, oats, barley, vegetables and all root crops. The soil varies from black to light sandy loam, with clay and gravel sub-soil, and ranges from eight inches to five feet in depth and is very fertile. The elevation of farming valleys range from 4,000 to 4,800 feet. Small fruits are grown and in some sheltered localities apples of superior quality and flavor are produced. The principal markets are at Anaconda and Deer Lodge. There are generally cash sales for all products. Fuel and fencing are obtained from one to ten miles from the farms. Water is generally secured at a depth of from 10 to 25 feet. Fairly improved farms with water rights can be purchased at from $12 to $30 per acre. Warm Springs and Gregson are two of the notable health resorts of the state, where hundreds spend their vacations and periods of recuperation, receiving health and vigor from the mineral hot spring baths. The most famous of the springs is at Warm Springs, where the water rises in a conical mound 50 feet high and with a surface diameter of 30 feet, and from this altitude comes a thermal spring whose waters are impregnated with curative medicinal properties. Both at this point and at Gregson, there are ample and modern accommodations for the comfortable entertainment of guests.

Two of the public institutions of the state are located in Deer Lodge county. The penitentiary at Deer Lodge, under the able management of Conley & McTague, has developed into one of the best apppointed and most satisfactorily managed reformatories in the country. The State Insane Asylum is located at Warm Springs, six miles east of Anaconda, where Mitchell & Mussigbrod care for the afflicted under special contract with the state. The institution has the highest standing of any in the west, its buildings being amply heated and provided with water from the hot springs; the appointments are as complete and convenient as modern ingenuity can make them, and no private or public complaint as to the care given patients has ever been heard. The purchase of the institution by the state is now being discussed by the press. The College of Montana is located at Deer Lodge and is one of the largest and most advanced educational institutions in the state. There are schools and churches in every community in the county.

But the great industrial activity in the county is the Copper Smelting and Refining works of the Anaconda company at the city of Anaconda, where the products of its mines at Butte are reduced and refined. They are the largest works of this character in the world, and their capacity is constantly being increased. The sales of this company from their mines for the year ending June 30, 1898, were:

Copper	$14,605,589
Silver	3,237,278
Gold	411,983
A total of	$18,254,850

The amount paid out for labor alone amounted to the enormous sum of $3,376,502. This includes the wages paid in Butte as well as at the reduction works at Anaconda. There were treated at the smelters 1,459,249 tons of ore, and the cost of improvements during the year amounted to more than three-quatrers of a million dollars. These figures are given to show the great industries that are

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bringing prosperity to the people of this country and furnishing a market for the products of the farmers.

Anaconda is the county seat and has a population of over 10,000. It is picturesquely situated on a plateau at the mouth of a canyon at the foot of the mountains. Public buildings are in course of erection. The general offices of the Butte, Anaconda & Pacific railway are located here. There is an iron foundry, brick yards and other attendant industries, which all add to the prosperity and insure the permanency and future greatness of the city. The enterprise of the people of Anaconda, based on the large pay roll of the great Anaconda Copper company and other industries, has built up one of the most progressive and prosperous cities on the American continent, with excellent railroad facilities, water works, electric lighting plant, a street railway and all modern city conveniences and facilities.

The city of Deer Lodge, with 1,500 inhabitants, one of the most beautiful cities in the state, is situated in the center of Deer Lodge valley and is noted as being a city of homes. The development of the mines near there will in time make it a prominent business center.

Flathead County.

Flathead county lies in the extreme northwestern corner of the state and comprises an area of more than 8,000 square miles; it was established from the north end of Missoula county in 1893, and now has an assessed acreage of 325,626. It derives its name from the Flathead Indians, a peaceful tribe whose boast is that they never shed white man's blood. This is an exceptionally favored county. Its valleys are large and fertile, its climate superb, and it is an exceptional county in the state from the fact that irrigation is not necessary to the cultivation of its lands. Crops can be raised without it, the rainfall being entirely adequate for all agricultural purposes. Beside the rich soil of its plateaus and valleys, it has lofty mountains, in which are rich deposits of mineral, exhaustless coal measures and building stone in great variety and abundance. Petroleum is found in the northern part of the county, and immense tracts of the finest timber in the Rocky Mountain region. The agricultural lands are of three classes; first, the bottom or meadow lands, possessing a rich, heavy, black loam and clay sub-soil, usually first settled upon; second, the bench lands, rising terrace-like to the foothills, being regarded as the most valuable for grain and vegetables because of less danger from frost; and third, the high bluff lands, used mostly for grazing and pasturage. In some instances, however, the best fruit and grain comes from this third class of lands. Dairying and hog raising are two of the most profitable industries in the county, and figure prominently in the income produced by every farm. There is always a good market for both these products, the supply rarely meeting the cash demand. The Flathead valley is estimated to contain 900 square miles, and is the garden spot of the county. There is yet a very considerable amount of unappropriated land that can be used for agricultural purposes. These government lands lie several miles from the towns and are being settled upon and are being rapidly made to add to the wealth of grain raised in the county. All grains and grasses do well in this county. In 1897 Flathead county raised 1,500,000 bushels of grain for market. Small fruits have been grown ever since the county was settled, and within

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the last year or two the young orchards coming into bearing are giving evidence of great possibilities for fruit growing, fully determining that as fine apples, plums, peaches and cherries can be grown here as anywhere in the state. Flathead also contains a vast wealth of timber land. It is estimated that there are 2,000 square miles or fir, pine, tamarack, cedar, spruce, larch and birch growing in this county and already there are thirty-one sawmills busily converting the timber into marketable lumber. The mineral resources of the county are not yet fully developed, but are not second in the natural opportunities offered to that of farming. Gold, silver, copper, iron and lead are the minerals found in this county. At Libby the mines are giving employment to many men. Coal has been discovered in large quantities, that in the Tobacco Plains district being pronounced a very excellent quality.

The Great Northern Railway has 197 miles of track in this county, crossing it from east to west. Flathead Lake, the largest sheet of water in the state, thirty miles long and ten wide, and navigated by steamers, is in this county. There are numerous other lakes in the county, and the lakes and rivers are filled with fish that furnish splendid sport for those piscatorially inclined.

There is a large area of the Flathead Forest reservation in the northeastern corner of the county, and a part of the Lewis and Clarke Forest Reserve is in the southeastern part. These reserves are under the control of the United States government, and a careful watch is kept to prevent them from being destroyed by forest fires or denuded by timber cutters. These forests are being preserved on the accepted theory that they will perpetuate the seasonable precipitation of moisture.

Kalispell, the county seat of Flathead County, has a population of 3,000 and is beautifully located near the confluence of the White Fish, Stillwater and Flathead Rivers, and twelve miles north of Flathead Lake. It is headquarters of the Kalispell division of the Great Northern Railroad Company, thus making it an important railway point; has paved streets, electric lights, water works, a complete sewer system, both surface drainage and sanitary; telephone exchange with branch lines to various parts of the valley, nine church organizations, graded school, two national banks, two flour mills, four grain elevators, brewery and a malting plant, U. S. Land Office, U. S. Weather Bureau Station, fine stores, good hotels, two newspapers, fire department, and is the general supply point for an extensive agricultural, mining and lumber district, extending from 100 to 200 miles in every direction. There are yet excellent opportunities for farmers, miners and lumbermen in the surrounding country. Kalispell has no commercial rival. The other towns in the county are Columbia Falls, where the State Soldiers' Home, a new but popular institution, is located; Libbby, a lively and most promising mining camp; Troy, Sylvanite, Dayton, Holt and Tobacco. All are thriving towns and are doing a prosperous business.

Fergus County.

In the very center of the Treasure State and equi-distant from the Northern Pacific and the Great Northern railways, lies a vast inland empire known as Fergus county. In outline it is nearly octagonal, except that there is a re-entrant angle in place of the southwest side. The northwestern boundary is formed by Arrow river, the northern and northeastern boundaries by the Missouri, the southern and eastern by the Musselshell. On the west the boundary is artificial, though it follows the ridge of the Belt mountains. The diameter of the county north and

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south is 110 miles, and the length of the county east and west is 125 miles. The county embraces an area of 6,762 square miles, or 5,675,000 acres, of which 2,702,656 acres have been surveyed, and 565,278 acres patented. A large area has also been entered under the homestead law.

It is doubtful if any region of equal area in the world has more varied resources than Fergus county, with its mountains, bench and valleys, its depth and richness of soil, with its crystal mountain streams and broad, majestic rivers, with forests crowning its hills and precious metals locked in the rock-ribbed sides of its mountains, Fergus county is a land of plenty of which one is entitled to boast.

From the southwestern side, and reaching almost to the center of the county, extend the picturesque range of Big Snowy mountains, and trending northward from the Snowies are the detached spurs known as the Judith and the North and South Moccasins. These divide the county into nearly equal portions, the famous Judith basin to the west and northwest, and the vast country drained by the Musselshell lying to the east and southeast. These mountain spurs seem one vast mass of low grade gold, silver, copper and lead ores, with here and there a ganglion of dazzling richness, as in the case of the Gilt Edge, New Year and Spotted Horse, from the last of which $2,500,000 has been taken. Many tons of this ore has been hauled in wagons to the smelters at Great Falls, a distance of 150 miles, and yielded enormous profits. The silver, copper and lead properties are undeveloped, owing to a lack of transportation facilities, but several of the gold properties are being profitably worked, the leading one being the Gilt Edge, from which over $60,000 has been taken in the past two months. Scores of ranchers have small cyanide plants, at which they very profitably put in their spare time and much more than make the expenses of their gold claim representation work.

An excellent quality of coal is found at various places in these mountains. The McDonald Creek mine has been worked more than any other. This industry is as yet, however, comparatively undeveloped. The numerous mountain streams of this central portion furnish many opportunities for the economical improvement of water powers, and these will some day be an important factor in inducing the establishment of manufacturing industries, and they also furnish abundant and easily diverted water for irrigation of the fertile contiguous lands. The Lewistown flour mills, electric lighting plant and a brewery receive their motive power from the east fork of the Judith river, and another corporation is now putting in an electric power plant that will receive its motive power for generating from the river. Lumber is manufactured in various portions of the county. No other industry is developing more rapidly than agriculture. Wheat, oats, rye and barley, timothy and all kinds of vegetables are produced in abundance. In many of the valleys and on the bench lands at the foot of the Snowies, no irrigation is required, but in all parts of the county the rich black loam produces the more abundantly when irrigated.

The first industry to be developed in the county was cattle raising, and is now second in importance to wool growing, in the latter of which this county is first in the state. The wool product of this year was some four million pounds, while the tax list shows the enormous number of 489,181 sheep, valued at $1,215,578. Many horses and hogs are also raised. Lewistown is the largest town in the state not on a railroad. Its population is 1,200. It has three large churches, two first-class hotels, two newspapers, two banks, a free library, United States Land Office, and all the other business institutions of a live and progressive town. Lewistown is the county seat and has a court house that cost $7,000, and a new public building is now being erected at a cost of $15,000. Eight teachers are employed in the public schools. There is a tri-weekly stage service to Fort Benton, a distance of 100 miles,

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time 14 hours; and a daily stage service to Great Falls, 120 miles, time 25 hours; and another daily line to Leadboro, a distance of 90 miles, 22 hours; and to Billings, 140 miles, time two days. There is long-distance telephonic communication with Great Falls, Billings and all outside points. The freighting of wool to Great Falls and merchandise on the return trip provides profitable employment for a large number of teams and men.

Stanford, Philbrook and Utica are villages on the stage road between Lewistown and Great Falls. Utica has a population of 150 and receives a large trade from the surrounding agricultural and grazing country. Ubet is a small village in the "Gap" between Belt and the Big Snowy mountains. Gilt Edge is a busy gold camp 16 miles east of Lewistown. Its population is about 250, and is steadily increasing. Maiden is another gold camp where there are several good properties that give great promise for the future. There are other villages in different parts of the county that are the local market points for their respective neighborhoods.

The streams of Fergus county abound in fish, the forest and prairies in game and the scenery in the mountains and valleys is lovely beyond description.

The only hindrance to the full development of the diversified industries and the many resources of the county is the lack of railway facilities, but it is certain that the next year will remove this obstacle. Then Fergus county will take front rank among the counties of the state.

Gallatin County.

The area of Gallatin county is over 2,600 square miles, of which fully 1,600 has been appropriated, a larger proportion than any other county in the state. The principal industry at present is farming, the Gallatin valley being one of the greatest agricultural valleys in Montana or in the whole Rocky Mountain region. Most of the lands to which water could be diverted at a small expense have been taken up. This county is rich in natural resources and is being rapidly developed. The Yellowstone railway is now under construction and will reach many of the undeveloped resources of the county. This road, starting at Brisbin, in Park county, passes over the main divide of the Rocky Mountains to the city of Bozeman, connecting with the Northern Pacific at Mountain Side, and follows up the West Gallatin river to the boundaries of the National Park. This railroad will run through the coal fields of Trail Creek, which are now being developed and will soon be furnishing an abundance of the finest coal in the state. Beside coal, the minerals of economic importance are valuable mica deposits, asbestos that equals that of the mines of Maryland and Georgia. Building stone is found in great quantity and variety. This railway will also open to the market large bodies of timber, estimated to contain about 400,000,000 feet of standing timber. There are a number of saw mills already cuttting this lumber for the markets. Along the West Gallatin are found red sandstone quarries containing building stone of excellent quality. Ferris Hot Springs, a widely known health resort eight miles from Bozeman, will be reached by this road. The railway will also open up a new route to the National Park by way of Bozeman, which will annually attract many visitors to this celebrated and beautiful valley.

Bozeman is situated in the heart of the Gallatin valley and has a population of about 3,000. It is a city of handsome residences and substantial business houses, that handle a large volume of business, this being the shipping point for the large

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crops of grain raised in the surrounding valley. Bozeman has electric lights, a fine system of water works, superior schools, and has two flouring mills, four grain elevators, two national banks, a first class hotel of two hundred rooms, seven churches and many of the fraternal and benevolent associations. It is the location of a United States land office, and the Experimental Station and the Montana College.

The present territory of Gallatin county may be defined as that of the valleys of the east and west Gallatin rivers and tributaries and the lower valleys of the Madison and Jefferson rivers. This, together with the encircling mountains, constitute a very compact tract of the most fertile soil in the world. Primarily, the interests of the first settlers were centered in range stock, cattle and horses with a few bands of sheep. This valley is not adapted to the range stock business as formerly practiced, as the altitude ranges from 4,000 to 4,800 feet in the valley proper, necessitating too long a period for winter stock feeding to make of it an ideal "cow county." Shortly after the live stock business was inaugurated, it was ascertained that the soil was especially adapted to cereals and forage plant growth; the vacant government and railway lands were speedily secured and the stockman who formerly had the entire valley for a range was soon completely fenced out of the lowlands and forced to shift his cattle to the foothills. Soon thereafter it was discovered that these were most desirable tracts for winter grain, and these in turn were speedily taken up and fenced, and the bands of stock were again shifted. The result of this shifting of interests is that the valley proper has been turned over to the farmer and transformed into one vast grain field, only broken here and there by fields of timothy, red top and clover. Upon the low irrigable lands, spring wheat is the main variety grown, while along the western slopes of the Bridger range are mainly winter wheat fields; these, under a system of triennial summer fallowing yield two consecutive crops of wheat, which are the wonder of all who behold them.

The Montana Experiment Station, located at Bozeman, the county seat of Gallatin, has devoted a large part of the past five years to a comprehensive study of the cereals; among other important points, it has confirmed these—the uniformly heavy crops of plump, solid, beautifully colored kernels; the thinness of the enveloping husks, giving a small percentage of offal, in milling; the relatively heavy protein content in best hard wheats as compared with the best grades of North Dakota wheat, this exceeding by 25 per cent that of Dakota. This establishes in our best hard wheat a very high milling value, the quantity and quality of bread manufactured therefrom is of the highest value. In oats it has been determined that nowhere in the United States is to be found a superior quality of grain for the manufacture of the great breakfast dish, oatmeal. All things considered, however, it is the barley crop that offers most of promise to the farmer. Here is produced, under good farming, strictly first-class No. 1 barley, plump, heavy kernels of that straw color that makes it noticeable whenever shown in comparison with other barleys. A strange fact concerning this crop is that it is not affected as to color by a moderate amount of moisture; barley frequently passes through rain storms here while in the shock without any radical change in the color of the grain. This is all the more wonderful, when it is known that in lower altitudes the dew will change it a grade in value simply by discoloring the kernels. Chemical analysis shows Gallatin barley to contain exactly the rightly proportioned amounts of nitrogen, crude protein, starch, malt sugar and dextrine to make a superlatively fine quality of beer; so pronounced is its excellence that a large per cent of the crops of '95, '96 and '97 was sent abroad to the leading old-country brewers, and the present prospect is that for years to come the Gallatin barley grower will receive

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for every bushel of No. 1 barley he produces double the price paid the barley grower of the Mississippi valley.

The average yields of grain in the county for the years '93, '94 and '95 were as follows:

Spring wheat .....33.5 bushels per acre.
Winter wheat .....37.9 bushels per acre.
Oats .....58.1 bushels per acre.
Barley .....46.3 bushels per acre.

These, by comparison with the average crops of the United States, are remarkable; but upon the plats of this station, under intensive farming and without the use of fertilizers, the average yield of grain for '94 was as follows:

Spring wheat .....41 bushels per acre.
Oats .....82 bushels per acre.
Barley .....52 bushels per acre.

Montana is known to be the best watered state in the union, and Gallatin county the best watered county in the state. More and better progress has been made by her farmers in the use of water in irrigation and general farm methods. It is a well known fact that there cannot be a profitable, economical service of water over slovenly, illy tilled fields, hence the Gallatin farmer, out of long years of experience, has evolved farm methods of cultivation and special irrigation machinery and implements worthy of note by the most progressive farmers of any state. In no section of the western hemisphere are the clovers more at home; three heavy annual crops may be harvested of the red and white clovers, the Swedish or Alsike clover and alfalfa; while the field pea flourishes in perfection, and timothy, redtop, orchard grass, Austrian brome and all the various pasture grasses thrive wondrously. Small fruits succeed remarkably well throughout the valley and the standard varieties give satisfactory results, especially when set on foothill farms.

Granite County,

The area of Granite county is 1,557 square miles, or over 996,000 acres, 103,482 of which is assessed. The county derives its name from the famous Granite mountain silver mine, and was organized in 1893 from parts of Missoula and Deer Lodge counties. Some of the first settlements in the state were made in this county. The county is principally mountainous and timbered, but contains the large and fertile valleys of Flint creek, Willow creek and Hell Gate, and large areas of grazing lands. These valleys are notably good agricultural regions and lying in close proximity to the large mining districts, the farmers find a convenient and profitable market for their produce. All grains, grasses, vegetables and root crops are cultivated in the valleys and yield well, and all small fruits are grown. The more elevated portions are principally cultivated for hay. All cultivated lands are irrigated and the available land and water are generally appropriated. The area of farming land could be largely increased by a reservoir system with which the surplus water in the earlier season could be stored. An extensive reservoir system could be established at comparatively small cost. Improved farms with water rights can be purchased in the several valleys for from $12 to $35 per acre. Fuel and fencing timber

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can be had convenient to all farming districts. The principal industry of the county is mining, and while the county suffered from the depression of the silver mining industry, new life is being infused and the mining camps are now scenes of renewed and great activity. The first silver mill in Montana, the "Hope," was built at Philipsburg in 1867, and is still a producer. The Granite Mountain mine at Granite, which has been denominated the "richest silver mine in the world," is again working. The Bi-Metallic, at Granite, the mines at Combination and the mines at other points in the county, are working and are prosperous. A belt of gold leads is also being developed in the northern part of the county, near the famous old "Beartown," which has long been noted for its rich placers. This new field at Garnett and vicinity gives promise of becoming one of the richest gold camps in the state. Several rich strikes have been made, which prove the ore is there in large and paying quantities and that all that is needed is devlopment.

Philipsburg, the county seat, is the terminus of the Philipsburg branch of the Northern Pacific railroad and has a population of 1,200. It is at present one of the most prosperous and thriving towns in the state, drawing its trade largely from the mining district at Granite, where the largest silver mines are located, and from Rumsey, where the mill for the treatment of the ores is located. Philipsburg has an excellent school system, there are numerous church organizations and a confident and energetic class of citizens. Other towns in the county are Granite, where the Granite Mountain mine, the Bi Metallic, the Hope and other mines are located. Rumsey, where the mill for the treatment of the Granite Mountain ore is located; Combination, where the mines of the Combination Mining company are located; New Chicago, Drummond and Bear Town.

There are 61 miles of railroad in the county, and communication is frequent and convenient between there and the markets of Butte and Anaconda. There are many excellent opportunities for profitable investment in farming or mining.

Jefferson County.

The area of Jefferson county is about 1,600 square miles, or 1,051,000 acres, 22,160 acres of which are assessed. A very considerable portion of the county is mountainous, but it has a number of fine agricultural valleys which are very productive, and located as they are adjacent to the mining districts, the farmers find a ready cash market. The county also contains a considerable area of good grazing lands. The principal valleys are the Boulder, Jefferson and the Prickly Pear. Their altitude is generally from 4,000 to 5,000 feet. All agricultural lands require irrigation and the available waters are generally appropriated. The soil is a black sandy loam, ranging from a few inches to four feet in depth. Wheat, oats, barley, potatoes and all root crops, grasses and vegetables are grown abundantly, and small fruits are grown in all the valleys. Timber for fuel and fencing is uusally obtained at four to ten miles from the farms. In some parts there are excellent stock ranges convenient to farms, but as much of the natural shelter is fenced in, the stock is limited to the number that can be sheltered and fed on the farms when the severest weather makes it necessary. Garden farming near the mining camps is a highly profitable industry. Some hay and grain is shipped to Butte and Helena. The area of cultivated lands could be increased with a storage system for water. Fairly improved farms with water rights can be bought in the different valleys at $12 to $25 per acre. The principal industry of the county, however, is mining for the gold and silver of which this county is a great producer.

This county suffered greatly by the depression in the price of silver, and

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some of the mines have been closed down in consequence. This is one of the very best counties to prospect in, from the fact that the veins of mineral are easily discovered, and when developed are great producers. In this county, as in all mining districts, the poverty of the prospectors has delayed development of the mines, but in the last two or three years the attention of capitalists has been successfully directed to the rich veins of ore that await the investment of capital, and the application of labor to return rich rewards, and as a consequence many paying properties are now working. Notable among them are the Ruby and the Hope, at Basin, both of which are examples of what pluck and energy can accomplish. These mines were idle for some time, but owing to the untiring energy of Hon. M. L. Hewitt they are both returning regular and heavy dividends to their owners. The Concord mine, owned and operated by T. S. Hogan, on the north fork of Clancy creek, is developed by a single compartment shaft 120 feet in depth from which drifts have been driven along the vein. The ore is a sulphide carrying gold silver and lead. The Concord promises to develop into a large producer within the coming year. During the last year prospects around Basin have been developed into mines and the field has hardly been touched. There are few places where there is such an inviting field for the investment of capital in the mining industry, as in the district surrounding Basin. Another old mining camp that is being once more brought into prominence as a producer is Lump Gulch. Much work was done in this camp in the earlier days of the state, and a very considerable amount of money was taken out, but owing to the expensive methods of treatment for the ore, the mines were closed down. Now, with modern and cheaper methods, these mines are again pouring their wealth into the channels of trade. Other mining places are Elkhorn, Whitehall, Corbin and Wickes. Copper and lead are also important productions of this county. There are in the county some large bodies of low grade ore that it is thought can be worked at a large profit, if the work is done on a sufficiently large scale. The mining camps of this county are prosperous and support thousands of people, and there is room for thousands more. Men with money can find no better place to invest it profitably than in the mining districts of Jefferson county.

Boulder, the county seat, is situated in the Boulder valley, and may be reached by the line of the Great Northern railway, or by the Northern Pacific railway from Helena. The population of Boulder is about 1,200. This little city has a fine court house, good schools, numerous churches, and the State Deaf and Dumb School. The famous Boulder Hot Springs are here, with ample and excellent hotel and bathing accommodations. There are also hot springs at Alhambra and at Pipestone, to which many resort for health and pleasure.

There are good schools in every locality and good opportunities for small industries in some of the towns.

Lewis and Clarke County.

The area of Lewis and Clarke county is 2,600 square miles. The county was named in honor of the noted explorers, Captains Lewis and Clarke, and now has a population of over 17,800. The county is skirted on the west by the Rocky Mountains and on the east by the Belt Mountains, and much of it is mountainous, but there are some large and productive valleys. The Prickly Pear valley, immediately adjacent to the city of Helena, is a large and fertile basin, and in the northern part of the county, extending up to the Sun river, the Dearborn and other streams

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water large and productive areas. The altitude of the valleys range from 3,400 to 4,200 feet. The soil is a sandy loam in the south, running to clay in the northern part, and varies from a few inches to several feet in depth. All the lands require irrigation for farming. All kinds of cereals, grasses, vegetables and root crops are grown successfully. The principal markets are at Helena, East Helena, Marysville and for the northern part at Great Falls. Fencing and fuel are obtained from one to twenty miles from the farms.

It is estimated that 200 square miles are irrigated and about as much more tillable land is yet to be artificially supplied with water. A large area of land in the vicinity of Helena could be brought under cultivation by establishing a system of storage reservoirs in the surrounding mountains, in which the surplus water of the early summer could be stored and used to water the lands during the dry season. The warmest and richest soil is not yet reached by the irrigating ditches. Surveys have been made and plans discussed for bringing the water from the Madison river into the city of Helena for the several purposes of providing the domestic water supply, power for industrial enterprises, and to irrigate the idle lands. The first cost of such a great enterprise has prevented its accomplishment, but it is one of the probabilities of the near future. The Dearborn Canal company and the Florence Canal company are large enterprises organized for the purpose of taking out irrrigating water and reclaiming arid lands in the northern part of the county. The farmers of the county are generally prosperous, finding a ready cash market for their produce.

The mining industry in this county is as great or greater than any other interests. From the discovery of gold in Last Chance gulch in the early '60s, until the present time, the mines have poured a steady stream of wealth into the channels of commerce. Quartz mining began early in the history of the county and the mines near Helena and around Clancy, in Lump gulch, produced millions of dollars for their owners. Later the mines at Marysville were discovered and Marysville became the center of a large and exceedingly rich mining district. The Drum Lummon, located by Thomas Cruse, of Helena, has achieved a world-wide reputation. The mining district around Marysville extends across the line into Deer Lodge county, where some of the best properties are located. Much of the ground in this district has hardly been prospected, and there are many very promising claims that only require the investment of capital to enrich the investors and add wealth to the community. Some of these mines are now being developed by local capitalists and give excellent prospects of success. This promises soon to become one of the great gold producing camps of the state. Rimini, a silver camp, is in this county, but not much is being done there at present, owing to the low price of silver. There is a large porphyry dike in this vicinity that is being worked with some success, and will pay munificently when worked on a sufficiently large scale. Other mining camps tributary to this county, and in which Helena citizens own large interests, are at Lump Gulch and Clancy, in Jefferson county, and at Winston, in Broadwater county. Altogether, the mining industry in this county is in a prosperous and healthy condition, and companies are being formed for the development of other properties, which will be undertaken at an early date. There are indications in the county of rich veins of mineral which, if found in almost any other state, would produce a stampede, but which lie undeveloped, and the only apparent reason seems to be that familiarity breeds contempt.

Helena, the county seat and the capital of the state, is located at Last Chance gulch, one of the great gold producing placer fields in the early days of the territory. The estimated population is 14,000 to 15,000. It is the second city in size in the state and is a most desirable place of residence. It is beautifully situated at the base

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of the mountains with a broad and fertile valley spread out before it. Six transcontinental or branch lines radiate from it, and it has long been known as the richest city for its population in the United States. A large dam has been thrown across the Missouri river fourteen miles from the city, and its great water power is being utilized by electrical conversion, and transmitted to the city for manufacturing and other purposes. The Helena Power & Light company is now using this power to run the street cars and the electrical current to light the city. The large gold, silver and lead smelters at East Helena are also using electric power in the operation of their plant. There is still a large amount of unused power afforded by the dam that is available for use in the manufacturing and other industries.

The state capitol is in course of construction, and when completed will cost $350,000, and the plans for a federal building, costing $100,000, are prepared and the site graded for building in the coming summer.

Ft. Harrison, garrisoned by United States troops, is located three miles west of the city, and nearby are the celebrated hot springs that supply the Broadwater hotel and natatorium—the latter the largest in the world. The United States government is now considering the proposition to purchase this magnificent property and convert it into a sanitarium for sick and disabled soldiers.

A university, conducted under the auspices of the Methodist Episcopal church, is just north of the city; the Roman Catholic cathedral of this diocese and St. Vincent's academy are located here. The city has excellent public and private schools and seventeen churches. It has four national and private banks, United States land office, electric street railway, electric lights, a large and well appointed public library, splendid public and private buildings, and all the advanced institutions and facilities of the progressive modern city. The facilities for securing power in any desired amount at a minimum cost from the East Helena dam, her central location and numerous railroads, affording traffic facilities to every portion of the state and connecting all important outside markets, makes the city of Helena an especially attractive place for the location of manufacturing institutions. As a desirable residence city, Helena presents perhaps more natural and acquired advantages than does any other locality in the state, and as it is, and will always be, the banking and political center, so will it be the social and educational center. Added to the natural attractiveness of its picturesque location and its moderate climate, it enjoys every modern facility of the eastern city. It is already a city of homes—not temporary places of abode in which people expect to live until they have acquired a competence and then retire to some more favored locality—but home-like homes, from cottage to mansion, where the owners intend and are contented to live and in their mature years to peacefully end their days. One feature that particularly recommends Helena as a place of permanent residence, is its educational institutions. Its public school buildings are equalled by few in the state and are operated at a cost annually of about $60,000, the superintendent receiving a salary of $3,300. Within the city there are nine graded school buildings, stone and brick structures that would do credit to any city double the size of Helena. The Montana Wesleyan University, one of the best educational institutions in the state, is also located here. St. Vincent's academy, a Catholic school for girls, is also a prominent educational institution of the city and receives patronage from every county in the state. Added to these are the usual quota of private schools and business colleges. All of the more prominent religious faiths are represented and many of them have edifices that would be creditable in any city. The price of desirable residence property is not high and the materials and the cost of construction of buildings is not excessive.

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East Helena is a thriving and prosperous town five miles east of Helena. The large smelting plant located there furnishes employment for hundreds of men.

Madison County.

The area of Madison county is 4,250 square miles, or 2,887,000 acres. Of this acreage 341,332 acres are assessed. The population of the county is about 8,000. Branches of the Northern Pacific railroad reach Norris and Pony, and during the past year a branch has been built from Whitehall to Twin Bridges, tapping a rich agricultural and mining territory.

The county is about two-thirds mountainous, the remainder large fertile valleys, bench land and foothills. The valleys are the Ruby, Madison, Willow Creek and Jefferson. Their elevation ranges from 4,000 to 6,000 feet; the soil of the bottom lands is generally a deep black loam, and on the bench lands a sandy loam with clay sub-soil. The soil varies in depth from a few inches to five or six feet. Except in rare instances, the lands require irrigation for successful cultivation, but with irrigation all the grasses, grains, vegetables and root crops grow well. There is a great deal of very fertile land in the county, and small fruits are grown, together with some varieties of the more hardy apples. There are also large areas of pasture lands and stock growing is one of the principal industries of the county. Many large herds of cattle and flocks of sheep are pastured, and stock growing in connection with farming is very successfully carried on. Fairly improved farms with water rights can be purchased at from $8 to $35 per acre in nearly all the valleys. The absence of railroad facilities has prevented the advance in the price of farm lands in proportion to lands of equal fertility and productiveness in other parts of the state, where the opportunities for reaching markets are better. Most of the lands where water can be economically diverted have been taken up, but there are lands on the Madison and Jefferson branches which can be reclaimed by building large irrigating ditches.

Madison county has as great a variety of and as extensive mineral resources as any county in the state, but the lack of transportation facilities has greatly retarded their development. The railroad extended to Twin Bridges during the last year, however, has largely stimulated the mining industry in the adjacent regions. In the southern part of the county asbestos is found with a length of staple of one to three inches. On Sweetwater creek, on the upper Ruby, cassiterite ore has been found, and at one time caused some excitement, but the per cent of tin contained in the ore would not justify treatment. More economical processes of treatment will some day allow the development of this industry. Placer mining by dredging is carried on at the mouth of Alder gulch and in a smaller way in other places. During the past year a sixty-stamp mill has been erected to treat the ores of the Kennet mine at the head of Moore's creek; at pony a 35-stamp mill, at Richmond Flat 20 stamps, at Red Bluff 10 stamps, and at the Leiter mine 20 stamps are crushing ore. The mountains near Sheridan are filled with prospectors and a large quantity of ore is being shipped to the smelters of Butte and Helena for treatment. In the Mayflower district a number of very rich mines are being worked, and many prospects only await development to prove their value. There is great activity all through the mining districts of Madison county and each year adds to the number of paying mines. Graphite, mica, building and lime stone, fire clay, lead, zinc, potter's clay and coal are found in paying quantities, as are sapphires, rubies, garnets and moss agates.

Virginia City, the county seat, was formerly the capital of the territory of

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Montana. It is not reached by any railroad, the nearest point being Dillon, on the Union Pacific railroad, and Twin Bridges, on the Northern Pacific, from which points communication is afforded by daily stage lines. Virginia City has a population of 900 and is located in Alder gulch, which was discovered in 1863, and is estimated to have yielded to the present time $80,000,000 to $90,000,000 in placer gold. It is 17 miles long and was probably the richest gulch ever discovered. Other principal towns in the county are Sheridan, Twin Bridges, Pony and Gaylord. The State Home for Orphans is located at Twin Bridges, and the new Parrot smelters are being erected at Gaylord. There are large mining industries at Pony and near Sheridan.

With its large area of agricultural land and its vast mineral resources, Madison county is one of the most promising counties in the state.

Meagher County.

Meagher county was named in honor of Thomas F. Meagher, who was for some years secretary of the territory of Montana. This county had originally about 10,000 square miles, but its rich valleys and thriving towns tempted men to seek its division until it now has about 2,500 square miles, giving a total acreage of 2,650,000, and of this 608,715 are on the assessment rolls. The population of the county is about 5,500. The leading industries at present are stock and wool growing and agriculture. In 1897 there were assessed in Meagher county 6,054 head of horses valued at $93,235; cattle 22,751, valued at $396,258, and sheep 323,675, valued at $564,330. It is the second largest sheep growing county in the state and it is one of the largest exporters of wool, mutton, sheep and beef cattle. The principal valleys are the Smith river and Musselshell. The soil is generally a sandy loam from seven inches to seven feet in depth, and produces abundant crops of all grains, grasses and vegetables. A portion of Meagher county is the oldest habitation of the white man known in the Rocky Mountain region, and owing to its health-giving mineral waters and its salubrious climate is now and always has been a favorite with the home-seeker, and as a consequence the land is well settled by an industrious, prosperous and intelligent people. Meagher county does not market her products by the bushel, but on the hoof, in the fleece and in the dairy product.

The displacement if silver has been a sad blow to the mining industry of this county, and the lack of railroad facilities has prevented the development of any but the richest mines. In the mountain ranges there are great copper leads, immense gold, silver and lead properties, and these only await the advent of transportation facilities to pour their wealth into the lap of industry. There are also vast quarries of building and lime stone.

Some idea of the advantages this county offers as a home for civilized man may be drawn from the fact that Meagher is the wealthiest commonwealth, in proportion to its population, of any agricultural subdivision on this continent, and her people have all accumulated their wealth since taking up their residence in the county. The little valley of Smith river, fifty miles long and twenty miles wide, is the gem of the Rockies. The small fruits are grown everywhere and standard apples, plums and cherries are grown in the valleys.

White Sulphur Springs, the county seat, is not reached by railroad, but from the terminus of the Montana railway, which is built to Leadboro, in Meagher county. The poulation of White Sulphur Springs is about 1,000, and the city is lighted by electricity. The city owns and operates the system of water works and is free from debt, except that incurred by the establishment of this plant. The sulphur springs

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at the county seat are notable medicinal waters, and despite the difficulty of reaching them, attract many health seekers, and with railroad communication would become a great resort. Tradition says they were known for their healing qualities for unknown centuries before the advent of the white man.

The lands in this county with easily available water rights are mostly taken up, but fairly improved farms with water rights can be purchased for from $10 to $30 per acre.

Stock growing is generally combined with farming.

The people of this county are perhaps more uniformly prosperous than in any other locality and are rapidly distancing other counties in the race for wealth.

Missoula County.

Missoula county lies west of the main range of the Rockies, has an area of 7,150 square miles, and is watered by the Missoula river, the Rattlesnake, the Blackfeet, the Bitter Root and several minor streams. These unite to form Clark's Fork, which with its tributaries drains the entire western portion of the county. The ranges of mountains that determine the direction of the rivers are the Rockies, in the eastern part of the county, and the Bitter Root and the Coeur d'Alenes, in the western part. Numerous peaks and elevations give tone and vigor to the landscape. Prominent among these are Lo Lo, Mount Jumbo, Point Lookout, Old Sentinel and University peak. Some very prominent elevations bear as yet no definite names. For the most part the mountain slopes are gentle and undulating; occasionally, however, they take a more rugged form. Sometimes these mountain sides are wooded to the very top and again they are open, furnishing excellent pasturage the greater portion of the year. Along the various streams and in many cases on the hill slopes, will be found large areas of arable land. The abundance of streams and the large flow of water in them makes it possible to irrigate the land wherever it is necessary to do so for the production of crops of any kind.

The mineral wealth of Missoula county is very great. Lead, iron, silver and copper are especially abundant in the western part, while gold, silver and copper predominate in the eastern. Coal has been located at different points but has not yet been mined very extensively. Granite, syenite, limestone and marble are abundant while building stone is very plentiful and of the very best and most durable varieties. Fire clay is found in considerable quantities and in many cases the ordinary clay is well adapted for brick making. The timber is mostly pine, tamarack and fir, although cedar, spruce, cottonwood and other varieties are well distributed throughout the valleys and on the mountain ranges. The valleys of the Missoula, of the Bitter Root and of Clark's Fork afford a wide expanse of land for agricultural purposes. The Flathead Indian Reservation, lying as it does principally on the slopes that border on Flathead lake and river, also affords a large and well watered tract of arable land. Missoula county is rich in minerals, ores and mines, but still richer in her agricultural and horticultural resources. While stock raising is carried on to a considerable extent in some parts of the county, the greater amount of attention is paid to the production of oats, rye, barley, wheat, hay, vegetables and fruits. The Bitter Root, Lower Missoula and Clark's Fork valleys are especially adapted to wheat raising, and large quantities are annually produced. The mild and even climate of the valleys make them wonderfully productive in fruits as well as cereals and vegetables. The apples, pears, grapes, plums and peaches, etc., of the Missoula and Bitter Root valleys are not excelled for beauty or for flavor. Small fruits, such as strawberries, blackberries, cherries, raspberries, currants and goose-

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berries, are abundant and of the best quality. Peaches are grown successfully in many localities. The strawberry is particularly excellent for its canning qualities, as it keeps its form and flavor when canned or preserved much better than when grown in many other places. The distribution of the railroads is such that excellent facilities are afforded for shipping and as a result the fruit is shipped in great quantities to Helena, Butte, Anaconda and other markets.

The lumber business is one of the important interests of Missoula county. The principal lumber center is at Bonner, near the mouth of the Blackfoot river. Here are located the extensive mills of the Big Blackfoot Milling company. Other sawmills at different points furnish an abundance of lumber for building purposes. The tamarack is very much prized on account of the beautiful finish that it takes, and on this account is very much used for doors, cabinet work, wainscotting, etc.

Missoula county has an excellent system of public schools. They are well graded and are managed by an intelligent and wide-awake class of teachers. The Catholics have excellent parochial schools and also the Academy of the Sacred Heart, located in Missoula. The State University is at Missoula and is growing rapidly in favor and influence. The new buildings in process of erection are almost completed and will be occupied early in the year 1899. A good equipment has been provided, an excellent faculty selected and full courses are in operation in the usual college and university lines of work. One hundred thousand dollars have been expended for buildings and equipment within the last year.

Missoula, the county seat, is a city of some 6,500 people. It is located at the mouth of the Hell Gate canyon, where the Rattlesnake river enters the Missoula. The city has elegant brick blocks and all modern improvements. It is one of the best built cities in the west and is noted for the absence of shacks and the inferior class of dwelling houses. Various enterprises give employment to a considerable number of people and the city is growing rapidly. Missoula has the most beautiful location of any city in the state, and commands commercially the entire trade of southwestern Montana. It has a United States land office, is the eastern terminus of the Coeur d'Alene branch of the Northern Pacific and the northern terminus of the Bitter Root branch, which traverses the fertile valley of that name. The presence of the State University serves as an attraction to draw the better classes to Missoula for the purpose of enjoying the educational and social advantages offered. The comparatively low altitude, mild climate, pure water and abundant shade and fruits and flowers offer all the surroundings that so much contribute to pleasant homes. There is also in Missoula a strong religious sentiment that manifests itself in the many churches that adorn the city. Many of the prominent denominations are represented. The abundance of field products of all kinds makes living comparatively cheap, for the markets are supplied with fruits and vegetables of all kinds, all grown within easy radius of the city.

The seat of the Big Blackfoot Milling company's operations is located on the Missoula, at the mouth of the Big Blackfoot river. The milling company affords employment for a large number of people. There are good schools and an excellent hotel.

Plains is a flourishing town located west of Missoula, on the main line of the Northern Pacific railroad. It is a depot for an extensive agricultural region, where cereals of all kinds are grown in abundance. The wheat and rye produced in this locality are both excellent in quality and abundant in quantity.

Thompson is noted for its lumber interests and for its nearness to rich mines. It is a flourishing village and an extensive shipping point. A very remarkable phenomenon is found here. In sinking wells, just before the water is reached, or coming up through the water is a cold, colorless gas which keeps an even tempera-

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ture the year round. Some of the merchants have piped this gas into their cellars and thus have a perfect cold storage without expense.

Clinton, Bonita, Ravalli, Potomac, Frenchtown and other villages offer opportunities for trade and help to advance the commercial interests of the county.

Fort Missoula for several years has been garrisoned by companies from the 25th U. S. Infantry. The fort is beautifully located on the Bitter Root river, four miles from the city of Missoula.

For beautiful rivers and streams of pure, limpid waters, and for graceful mountain scenery Missoula county is unsurpassed. There may be found that which is more rugged, there may be deeper canyons and larger rivers, but for picturesque mountains and rivers, with bright sunlight over all, this county must always stand pre-eminent.

Park County.

The history of Park county, which now has an area of 1,798,000 acres, dates from the year 1872, when a party of prospectors, roaming over Montana in search of yellow metal, discovered placer mines in Emigrant gulch and immediately began operations at that point. This settlement was known as Yellowstone City, and in the early days was a flourishing trading point. From Yellowstone City, parties were made up in the early days to explore for mineral in the district which is now included in Park county, with the result that several quite important settlements were established in various portions of the county. Mining naturally attracted the attention of the early settlers, but later the various other resources of the district were recognized, and soon a thrifty settlement of ranchers pushed into Paradise valley in the upper Yellowstone. The first crops of these hardy and enterprising frontiersmen, produced on their as yet but slightly developed ranch lands, convinced them of the worth and value of the soil for agricultural purposes and within a short period a considerable portion of the lands, suitable for the growing of grain and vegetables, were occupied by an experienced lot of ranchers. The district did not make very rapid advancement, however, until the advent of the Northrn Pacific railroad, in the fall of 1882. This marked the beginning of a general development of the district that now comprises Park county, which was created by act of the territorial legislature Feb. 18, 1887, and was organized May 1 of the same year. Since the organization of the county rapid strides have been made and despite the fact that nearly one-half of the area of old Park has been lost in the creation of Carbon and Sweet Grass, the assessed valuation is nearly four million dollars and the county boasts of a population of more than 5,000. During the past 10 years a number of substantial business centers have sprung up, the most important of which is Livingston, the county seat, a bustling little city of 3,000 population.

Included within the boundary lines of the county of Park is one of the richest and most promising districts of Montana. Nature has been lavish in her gifts, for every portion of the county abounds in a variety of rich natural resources, which, when more fully developed, will make her one of the greatest wealth-producers in the state. The county is nearly 90 miles in length and about 35 miles in width. The total area is about 3,000 square miles, three-fifths of which is agricultural and grazing land, the remaining two-fifths being mountainous, the latter of which is rich in gold, silver, lead ores and coal. The Yellowstone river, which takes its source in the National Park, flows north and through the county for a distance of about 90 miles, and is bounded on either side by agricultural lands, which are rapidly being

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settled up with a thrifty class of farmers. The numerous tributaries of the Yellowstone river also have within their valleys large tracts of very productive lands, the most important of which is the Shields river valley. The agricultural district in Park county is extensive in area. It includes the broad and productive valleys of the Yellowstone river and its numerous tributaries, which, with the bench lands adjacent, form a district which will eventually support many thousands of people engaged in the agricultural pursuits. The splendid irrigation system of the upper Yellowstone and Shields river valleys make a failure of crops next to impossible. All kinds of small grain, hay and fruits are successfully produced. Of late it has been shown that the valleys are well adapted for the raising of fruit, including apples and many varieties of berries. Ranchers are now paying considerable attention to the production of fruits, and there are many promising young orchards in the valleys. The bench lands of the Shields river valleys produce an excellent quality of wheat, which is pronounced to be equal to that raised in the famous Red River valley. Probably no locality in the entire west offers such advantages for diversified farming as does eastern Montana. As yet a large percentage of the tillable lands in the Yellowstone and tributaries are unsettled, but with the development of the mining resources surrounding, every foot will be improved and occupied. Several large irrigating projects are now under way, which when complete will reclaim thousands of acres of valuable bench lands.

The foothills adjacent to the agricultural lands offer splendid inducements for those wishing to engage in stock growing. The stock interests of Park county are among the most important of its many industries. Besides the many large flocks of sheep and herds of cattle which range on the mountain sides for many miles in every direction from Livingston, the farmer in the valley engaged in raising grains and vegetables has placed small bands of sheep and cattle upon the surrounding foothills, which from present appearances will be no small aid in making the agricultural pursuit a complete success. Park county offers unusually good opportunities for stock raising on a large scale. The foothills and mountain sides give an abundance of feed during the winter and summer months. The winter season is mild and it is seldom necessary to provide either hay or shelter during this period. This is a big advantage over the majority of stock raising localities and makes it possible to conduct the industry at an unusually good profit.

Mining operations in Park county were first begun in the fall of 1872, when prospectors discovered rich placer diggings in the upper Yellowstone valley. Soon afterward important discoveries were made in the territory now embraced within the famous New World mining district, located in the southern portion of the county and adjacent to the National Park. During the few years following, important discoveries were made in the mountains ranging along both banks of the Yellowstone river, among which was the discovery of large deposits of coal in the range of mountains to the west of Livingston, and extending up the river fully fifty miles. In 1882 a part of the Crow reservation, containing rich mineral lands, was thrown open to settlement. Then began an extensive development of the properties previously discovered. The coal deposits attracted the attention of smelting companies in the western portion of the state, and when it was demonstrated that a large per cent of the coal was suitable for coking purposes, the mines were developed and large plants were erected for converting the product into coke. The greatest rush, however, was to the New World mining district, where during the first ten years after it became a part of the public domain, no less than two thousand claims were located. It is conceded by mining experts that the mineral deposits of Park county are among the richest and most extensive in the west. The mines of the New World district, located in and about Cook City, have for many years been

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famous for their wealth, but because of their peculiar situation they have not been provided with railway transportation, and for this reason it has been difficult to operate them to advantage. These mines are located about 80 miles south from Livingston, in the extreme southern portion of the county. Cooke City is surrounded on all sides by high mountain ranges and has no natural outlet except by water grade furnished by Soda Butte creek, which passes through a portion of the National Park. In order to make this route available for railway purposes it is necessary to secure congressional action which will either give permission to construct a road through that portion of the Park or segregate that portion of the reserve lying east of the stream. As yet the effort put forth to secure the desired legislation has resulted in failure, but the friends of the measure are still at work and feel confident that it will pass at the next session of Congress. Despite the fact that the means of transportation are so expensive, several mines in this district are being successfully operated. Among them are The Daisy, The United States, The Morning Star, The Alice E, the Great Republic group, Homestake, Moulton, Black Warrior, White Warrior, Little Daisy, Snowslide and many others, and all would soon become important producers were it not for the transportation difficulties. No one familiar with the district has any doubts regarding the great resources or future of the camp. The pioneer settlers of Cooke City were the strongest types of western miners, and in developing the resources of this district they builded for the future. To the south of Livingston and extending up the valley of the Yellowstone is another rich mineral district which gives most favorable indications of becoming a great producer of precious metal. During the past few years operations on these mines have been carried on very successfully. With but one or two exceptions the results have been satisfactory and each month the prospects are growing better. The McCauley Milling company's property ranks as one of the most prosperous. A twenty-stamp mill is kept in continuous operation with very good results. The placer grounds bordering on the Yellowstone river in this locality are very rich and have been worked successfully for a number of years. In the bluffs adjacent to these placer grounds and extending up the Yellowstone and along the several tributaries are to be found extensive deposits of free-milling quartz. Among the promising and most important mines of the upper Yellowstone may be mentioned the Great Eastern, St. Julian and the McCauley Milling company's properties. These show up immense bodies of free-milling quartz. The ore is gold-bearing and assays from $20 to $40 per ton and up. The Natural Bridge district is attracting considerable attention. Almost every portion of Sheep mountain, which is included in the district, has been located, and the prospects for the future of the camp are flattering.

The coal and coke industry in Park county is rapidly assuming large proportions. Two or three quite extensive coking works have been erected, the most important of which are the Montana Coal & Coke company, at Horr, and the Yellowstone Coal & Coke company, at Cinnabar.

Park county is a logical point for the location of reduction and smelting works. Here is an inexhaustible supply of fluxing ore which, with magnificent water power to be found at several points on the Yellowstone river, makes it possible to reduce the ore at the lowest possible cost.

Ravalli County.

The area of Ravalli county is 2,889 square miles, and it has an assessed acreage of 166,066 acres. It is one of the extreme western counties of the state and was created in 1893 from the southern part of Missoula county. The principal valley is

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the Bitter Root, the river flowing north and south through the county. It is sheltered on the west by the Bitter Root mountains, which form the western boundary of the state and extend far into Idaho. The Bitter Root valley is, in climate, fertility of soil and scenery one of the most beautiful and attractive in Montana. The mountains rise in dark and rugged grandeur along each side of the valley and are covered by the finest pine, fir and tamarack in the state. The Bitter Root valley is on an average six miles in width and ninety miles in length. The altitude ranges from 3,200 to 4,000 feet. The soil is a rich black loam of great and seemingly inexhaustible fertility and is free from rock. It produces crops in great abundance from year to year with no apparent diminution of productive strength. Nearly every foot of land is cultivated or is easily cultivable. The land is divided into bottom, bench lands and foothills. The bottom lands skirt the river, are smooth and level and from one to ten miles in width. The bench lands, with an abrupt rise of one or two hundred feet, run back on a gentle incline to the foothills, vary in width from one to five miles, and are scarcely less fertile than the bottom lands. While the bench lands are considered the best lands for fruits, berries and vegetables, and the bottom lands superior for the heavy crops of grain and hay, little if any difference is apparent in the quantity or quality of crops grown. Back of the bench lands are the foothills, quite as fertile as any land in the valley and especially adapted to fruit raising. They are cultivated away up into the mountains and many homes on the mountain sides are surrounded by fruitful orchards and productive fields. The mountains furnish a large range for stock and many farmers combine stock raising and farming successfully. All lands are irrigated for the most successful farming, although in some places crops are raised without. The rainfall in this valley is sufficient to reduce the necessity for irrigation to a minimum, an important aid in the economical productions of the farm. Fencing and fuel are obtained from one to ten miles from the farms and water is secured in wells at ten to thirty feet. Wheat, oats, barley and all grains yield enormously and vegetables and root crops are grown in abundance and perfection. Both fall and spring wheat are grown, and timothy, clover and alfalfa furnish abundant hay crops.

Ravalli county is essentially the fruit county of Montana. Fruit has been grown for thirty years; the better methods of culture and varieties adapted to soil and climate have been learned and fruit growing is now one of the most important industries in the county. Apples, plums, cherries, grapes, apricots and prunes grow profusely and in perfection. Worms and insects are unknown, the fruit is large, of delicious flavor and unexcelled in keeping quality. Already a trade has been established and Bitter Root apples are shipped in car loads to eastern markets. Berries are the pride of the valley and grow to perfection, having no competitors in the market for size and flavor, and reaching the market as they do, late in the season, after the supply from warmer climates has been exhausted, always command the highest prices. The orchard of the Bitter Root Orchard company, near Hamilton, consists of 380 acres of ground in one contiguous body, set in apple trees and now bearing, is evidence of the confidence of the future of the valley as a fruit growing district.

The Bitter Root branch of the Northern Pacific railway runs up the valley as far as Grantsdale, and furnishes daily communication with the markets of Butte, Anaconda, Helena, and all tributary points.

The county seat has been located at Stevensville, a thriving little town in the north end of the county, of 600 inhabitants, and is the center of a rich farming district. At the election held in November of the year 1898, the people by a vote decided to remove the county seat to Hamilton, a more centrally located point and the commercial center of the county. Hamilton has a population of 1,800, has ample

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banking and hotel accommodations, and is surrounded by a large and fertile farming community; has an electric light plant and water works system with capacity sufficient to supply a city of 10,000 inhabitants, a mammoth sawmill costing $250,000 and employing 100 men, with a capacity of 175,000 feet of lumber daily; a planing mill and a sash and door factory costing $50,000 and employing 50 men the year round. There are graded schools and a high school, churches, business houses, elegant private residences and all the improvements that make up a modern city.

The magnificent ranch of Mr. Marcus Daly, comprising 15,000 acres, situated near Hamilton, is one of the most highly improved and best kept ranches to be found anywhere. About 200 men are employed on this ranch, and Mr. Daly's racing horses are bred here.

Corvallis, Victor and Darby are good villages of 150 to 250 inhabitants, and have a good local trade from the rich surrounding country.

Some mines have been developed in the county, but the only mine reported as working at this time is the Curlew, near Victor, which employs 12 or 15 men. The Bitter Root Forest reservation occupies the entire western part of the county, and is under the control and supervision of the United States government.

The principal industries are farming, stock raising, fruit growing and lumbering, and with the warm chinook winds tempering the blasts of winter shielded on all sides by walls of mountains, the climate mild and salubrious, the soil fertile, the timber inexhaustible, the county has a bright and promising future.

Silver Bow County.

Silver Bow is the smallest county in the state, having only 915 square miles, with 62,475 acres assessed, but as the county's assessed valuation foots up $26,819,943, an indication of Butte's great wealth is given. It is essentially a mining county, but little of it being adapted to agriculture. It is chiefly mountainous. There are some valley lands, but they lie at an altitude of 5,000 to 7,500 feet and are chiefly devoted to hay raising, which is the most remunerative crop. The principal industry is mining, and this is mainly confined to the vicinity of Butte, the county seat and the mining business center of the state. Butte owes its greatness to the inexhaustible deposits of mineral that lie beneath the surface. Its population is estimated at 65,000, an increase of 30,000 in three years. It has four transcontinental and branch lines of railroad, being reached by the Northern Pacific, Great Northern and Union Pacific systems, and the Butte, Anaconda & Pacific. The mineral belt of Butte, so far developed, lies in an area of about two miles square, but this small district lays unchallenged claim to being the richest land of its size in the world. Within this limited territory is a network of mineral bearing quartz veins that yielded during the year 1897 gold, silver and copper to the amount of $41,730,105.36, and while the report for this year is not yet available, it can be stated that the output of last year will be greatly exceeded. The working of these mines not only furnishes employment to the thousands of men in Butte, but to additional thousands in this and other states, who furnish the food, clothing, machinery and mining supplies. It is estimated that there are employed in the copper mines of Butte 6,000 miners; in the silver mines 1,000, and in the smelters, reduction works and industries attendant on the production of these metals about 2,000 employes.

The production of mineral, as given by Hon. Eugene B. Braden, assayer in charge of the United States Assay Office in Helena, for 1897, was as follows:

Gold, 54,198.037 fine ounces	$ 1,120,372.86
Silver, 10,710,815.45 fine ounces	13,848,327.04
Copper, 236,826,597 fine pounds, at $11.30 per cwt.	26,761,405.46
Total for 1897	$41,730,105.36

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Gold, 59,815.755 fine ounces .....$ 1236,501.40
Silver, 11,120,731 fine ounces 14,378,319.89
Copper, 228,886,962 fine pounds, at $10.92 1-2 per cwt..... 25,005,900.60

Total for 1896 .....$40,620,721.89

The corresponding figures for 1896 were:

This shows an increase of more than one million in one year.

Figuring the gold and silver at their coinage value, and the copper at 12 cents apound, the total output of the three metals in Silver Bow county since the beginning of production in 1882 is as follows:

Gold, 539,288.164 fine ounces .....$ 11,148,075.74
Silver, 113,605,001.52 fine ounces 146,883,234.29
Copper, 1,875,462,242 fine pounds 225,055,467.04

A grand total of $383,086,77.07

In the production of this enormous output there are paid out in wages a sum estimated at $750,000 each month.

Butte well deserves the title of the "greatest mining camp on earth."

The first copper in the state was found there, and although for many years after attention was principally directed to gold and silver mining, the greater product of the camp is now copper ore that carries a large by-product of gold and silver. Nearly all the silver and gold-capped veins have run principally into copper. The quartz mines of the camp have been worked continuously for twenty years, latterly by gigantic machinery and improved appliances, yet so enormous are the deposits that they are practically inexhaustible, and the deepest working has only reached a depth of about 2,000 feet, or to be more specific, taking the more prominent mines, the Gagnon is down 1,600 feet, Mountain Con. No. 2 1,500, Alice 1,500, Lexington 1,500, Modock 1,000, Anaconda 1,400, St. Lawrence 1,400, High Ore 1,700, Green Mountain 1,700, Never Sweat 1,400, Mountain Con. No. 1 1,500, Diamond 1,200, Bell 1,500, Poulin 1,200, Mountain View 1,300, Buffalo 1,000, Silver Bow No. 1 1,000, East Grey Rock 1,500, Colusa Parrot 1,150, Original 1,000, Parrot 1,250, Rarus No. 2 900, Rarus No. 1 800, St. Lawrence No. 2 800, Moonlight 950, Pennsylvania 900, Leonard 800, East Colusa 800, Atlantic 800, Glengarry 800, West Colusa 800, West Gray Rock 700, Blue Jay 775, Ramsdell Parrot 600, Speculator 700, J. I. S. C. 600, Minnie Healey 600, Magna Charta 700, Blue Wing 650, Little Mina 550, Original No. 6 250, Nettie No. 1 300, Nettie No. 2 450, Nettie No. 3 540, Old Glory 500, Nipper 500, Henry George 200, Westlake 250, Chambers 300, Great Extension 300, Belle of Butte 400, Iduna 200, Anderson 300, but to the depth of the workings indicated by these figures must be added the increase of the present season, of which there is no record now obtainable. This list, which includes only the more prominent producers, is not only ample evidence of the present standing of Butte as regards her mineral wealth, but is also proof of the inexhaustible character of her mineral deposits.

Butte is always spoken of as a mining camp, but it has long since passed from the list of "camps" and has attained the proportions and stability of a city. The main streets are being paved with granite blocks on a concrete foundation. Other streets are macadamized and sidewalks have been laid on all the streets. The system of sewers extends through all the principal parts of the city, affording the most thorough artificial drainage. There is a system of water works, an electric lighting plant and an electric street railway which has extended its lines to Meaderville, Centerville, Walkerville and South Butte, and which gives excellent service. There are commodious county buildings, a large and well planned city building in which are the headquarters of the fire department; a splendid auditorium, in which

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are the Armory hall, the Public Library, and a large public hall. The Free Public Library was opened to the public Feb. 7, 1894. This library had its inception in a gift of $10,000 made by Mr. Charles X. Larabie, a former resident of Butte. This amount was increased to $22,000 by subscriptions from the citizens of Butte, and the result is 22,000 carefully selected books are on the shelves. The total issue of books for the year 1897 was 122,265.

The public schools of Butte are attended by more than 6,000 children, requiring a corps of 110 teachers. Almost every year witnesses additions to the school buildings in the city. The citizens of Butte have always manifested intense interest in the public schools and as a result they are ably conducted. In addition to the public schools there is a large parochial school maintained by the Catholic church organization.

Butte has a large church-going population and almost every congregation has a fine church building. Butte has a corps of earnest and energetic health officers and the sanitary conditions of the city are carefully watched. Butte is a strong labor union town, having some of the strongest organizations in the west. These unions have so conducted their affairs that they command the respect and receive the support of the people, and as a result of their organized efforts the rate of wages is good and the standard of living is high. There are numerous fraternal and beneficiary organizations; the city has a large and efficient police force; a trained and well equipped fire department, and a live, energetic administration. The State School of mines is located here and will soon be giving instruction to an army of pupils desiring to equip themselves for the mining and collateral professions.

The city is passing through a building period. During the year ending May 1, 1897, the number of buildings erected was 450, at a cost of $483,665, and for the year ending May 1, 1898, the number erected was 932, at a cost of $860,000, and the ensuing year promises to far surpass the last. Some of the buildings erected are notable for both size and elegance.

Among the names that will go down in the history of the founding and development of Butte into the greatest mineral producer of this or any other continent, will be those of W. A. Clark, J. B. Haggin, Marcus Daly and the late George Hearst, all men of large wealth and extended abilities and energies that were devoted to and were the prime factors in the building of the city.

Butte is a live, enterprising city, and the people are fully abreast of the times in all that an intelligent, wealthy and progressive people can achieve for public or personal welfare and comfort, and affords opportunities unexcelled, if equalled on the continent, for those who are competent or able to engage in mining or kindred enterprises.

Sweet Grass County.

Sweet Grass county was created in 1895 from parts of Park, Yellowstone and Meagher counties, and what was formerly a part of the Crow Indian Reservation. It has an assessed acreage of 455,591, and a total area of 1,841,000 acres. Its boundaries extend 35 miles north from Big Timber, the county seat, about the same distance south, 15 miles west and about 20 miles east, embracing an area of about 3,000 square miles of agriculture, grazing, timber and mineral lands. The population is about 2,500, about 600 of whom are in Big Timber. Other smaller towns are scattered throughout the county. The principal one of these is Melville, 25 miles north of the county seat. It would be hard to find a more prosperous or more contented community than that composed of the settlers whose homes are scattered

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over this picturesque and fertile valley. Nearly, if not quite all the government land is occupied hereabouts, in quarter sections. The soil is very productive and there is good range toward the Crazy mountains, where there is also a plentiful supply of both dry and green timber for ranch improvements. In the early history of the settlement, the land which is now cultivated so successfully was given over to cattle and horses. Sheep were first introduced in the '70s, and since that time progress has been very rapid. To-day the Sweet Grass is fenced from its head to its mouth; the land is well watered, naturally and artificially, and produces abundant crops of hay, vegetables and grain. Cattle and horses have, for the most part, given way to sheep.

The Fish Creek country, one of the finest grazing districts in the state, lies to the east of Melville. The land in the Fish Creek country is, for the most part, more or less broken, and the hills, on which the snow seldom lies more than a day or two at a time, are admirably adapted for winter grazing. The strong chinook winds that sweep the country keep the ridges bare, and it is seldom necessary to feed stock. The Fish Creek country is devoted exclusively to the sheep business. The settlers there have, however, a system of dams and reservoirs in view for storing the water which now runs to waste in the early spring, and as these are built the reclamation of the arid lands will follow, and farming will then be combined with wool growing.

The territory lying between the West Boulder and the Yellowstone rivers, comprising 44,448.65 acres, has been segregated by the State Arid Land Commission and a contract let to the Holland Irrigation Canal company, for the construction of a canal for its irrigation. Under the same contract 8,200 acres adjacent to Big Timber creek and about 10 miles north of the town of Big Timber, will be reclaimed by a canal. The commission has purchased the canal system of this company, which a few years ago secured the location of a colony of Hollanders at the point mentioned. This colony has grown into a very prosperous community of about 50 families. When the colonists located on the newly irrigated lands of the company, they had nothing; now they are in possession of well developed farms, enjoying all the conveniences of agricultural communities in the older states, but securing a meed of prosperity that is not nearly equalled by the eastern farmer. The colony has a cheese factory and a demand for its product that exceeds the output. The community has a Dutch Reform church and there is an excellent public school. Arrangements have been made to extend the colony over all the lands in that district, and the task will be fully accomplished during the next two years. When the settlement of this district is completed, there will be no more prosperous or desirable section in the northwest.

South of Big Timber is the Boulder river and the Boulder valley, the former famous for its unsurpassed trout fishing; the latter for its fertility and beauty. There is no prettier drive than that from Big Timber to the Natural Bridge falls, at the head of the Boulder river, and there is no better trout fishing in the world than the Boulder river furnishes. A succession of fine, well improved farms cover the distance from Big Timber to the head of the river, a distance of 30 miles. Along the course of the river and its branches, all the land is occupied. The settlers are almost exclusively farmers and they are especially successful. They raise just about everything in the line of fruits, vegetables and cereals that can be raised in Montana. Back from the river, on either side, is an abundance of land as yet used only for grazing purposes, but soon to be as fruitful as that near the river. These lands can be irrigated from the Boulder and propositions toward that end are rapidly developing. The Natural Bridge and the falls are the scenic wonders of this county, but it is impossible in the space allotted to do them the scantest justice. The National Park has nothing more grand and wonderful than the Natural Bridge, falls and canyon.

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At the southern limits of the county is the mining camp of Independence. The place is quiet now, but prior to 1893 it had all the bustle and life of the typical Montana gold mining camp. The Independence mine yielded nearly $100,000 in gold in one season, but the financial stringency compelled a cessation of development work which has not yet been resumed. Other quartz and placer mines are being worked in the district with encouraging prospects. Coal has been discovered along the Boulder, a six-foot vein of fine quality being recently opened. A railroad up the Boulder to the National Park,—an entirely feasible route—affords an opportunity for the profitable investment of capital, which will not long be neglected. Such a road, besides reaching the National Park, could tap the mining camps of Contact, Independence and Cooke City, and the Natural Bridge falls, which affords an easily improved and large water power.

Big Timber is a substantially built town with more business about it than many an eastern town ten times its size. There were over three million pounds of wool received at the Northern Pacific warehouse this season, most of which is the product of this county, and the price paid averaged about 16 cents per pound. This is the wool clip alone, and there are the mutton and beef products and the wheat crop to be added to the sources of income. Big Timber has made some progress in manufacturing enterprises, partly utilizing the water power of the Boulder river. The Pioneer roller mills will, in a few days, be closed down long enough to enlarge them to twice their present capacity of 50 barrels per day. The establishment of these mills has been of inestimable value to the farmers of the county. They have an opportunity for profitable employment now which they never had before, and they are taking advantage of it, as is proven by the very largely increased acreage of wheat sown since the mills have been in operation. Another of Big Timber's enterprises is the Sweet Grass creamery, established about the same time as the mill. The product of this creamery is in demand all over the state, and the only drawback to its entire success is the shortage of cream, which in the winter is entirely inadequate to the demand. The supply, however, is increasing, and in another year or two will be ample. There is a movement on foot to erect a woolen mill and it has every prospect of being carried to a successful conclusion.

Big Timber has a population of 500, commodious and substantial school house. two churches (Episcopal and Congregational), a national bank, a fine stone court house, two newspapers and two hotels.

Teton County.

The area of Teton county is estimated at 7,900 square miles, of which perhaps one-fourth is covered by the Blackfeet Indian Reservation. Its assessed acreage is 146,100 acres. The county was established in 1893, from the western part of Choteau county. The estimated population is 4,000. The western part of the county is mountainous, and the eastern largely undulating prairie, with some valley lands. It has always been largely a grazing country. It is estimated that there are 150 square miles of tillable lands not yet irrigated, and the remainder of the county, except the mountains, is chiefly adapted to grazing. The elevation of the valleys range from 3,000 to 4,000 feet. The soil varies from a sandy to a gravelly loam, and from one to six feet in depth. Wheat, oats, barley, rye, flax, timothy, alfalfa and all the vegetables and root crops have been and are being cultivated successfully. All the small fruits, and in some localities apples, are grown.

The depth of snowfall ranges from 12 to 20 inches, but chinook, or warm winds, are frequent, and the snow does not remain continuously. Fuel and timber are

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obtained from one to 40 miles from the farms, and water is obtained at a depth of from 10 to 50 feet. Irrigation is necessary everywhere for cultivation. Hay, oats and barley are considered the best paying crops and what is not fed on the ranches is marketed at Choteau, Great Falls and other points. Great Falls will always furnish a good market for the products of the county.

There are good ranges for stock near all the farms, and there is a good field for farmers who desire to combine farming and stock raising. The Montana Land & Water company has brought out a canal with a capacity of 12,000 inches of water and has reclaimed about 10,000 acres. A large part of this land has been disposed of to settlers who have colonized and are cultivating the land. Other large ditches are being built and much land is being brought under irrigation. A co-operative company is talked of to bring water from the north fork of the Sun river to cover a large and fertile body of land in the southern part of the county. The leading industry in the county is stock raising, and there are many large bands of sheep and herds of cattle grazed on the wide ranges that extend back from the streams. In 1898 there were assessed in this county 253,336 sheep, valued at $630,464; 24,819 cattle, valued at $515,605; 7,471 horses, valued at $74,890, and 1,850 mules, valued at $48,100. The stock in the county is increasing rapidly.

The opening up for settlement of a portion of the Blackfeet Indian Reservation has attracted a large number of prospectors to the mountains, and many claims have been located which promise to place the county in the list of the mineral producers before many years.

The Great Northern railway has 95 miles of road in Teton county, traversing it east and west, and the Great Falls & Canada railway has 114 miles crossing the county north and south. The assessed valuation of railroad property in the county is $662,240.

Experimental boring for artesian wells has proven successful, a good flow of water having been obtained in several places. In sinking these wells a strong vein of coal was discovered at a depth of some 300 feet.

A large portion of the western part of the county is included in the Flathead Forest Reservation.

Choteau, the county seat, has a population of about 300. It has no railroad communication but is reached by stage from Steele, on the Great Falls & Canada railway.

Valley County.

Valley county is located in the extreme northeastern corner of the state, and of itself would make a sizeable state. It was established as a county in 1893 by detaching and organizing as a separate county all that portion of Dawson county lying north of the Missouri river. Its estimated area is 13,486 square miles, which includes the Ft. Peck Indian Reservation. The estimated population of the county is 1,500. The principal industry of the county has been and probably will continue to be stock raising, although of late years considerable advance has been made in the development of the agricultural resources.

In 1898 there were assessed in this county 2,965 head of horses, 10,206 head of cattle, 70,410 head of sheep, and 1,639 mules, the aggregate assessed value of this stock being $864,213. These figures show the immense stock interests of the county and the source of the wealth and prosperity of her people.

The Milk river flows through the central part of the county, watering a broad and fertile valley, capable of sustaining a large population in plenty. On either

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side of this great valley are the rolling prairies that afford the pasture in which lies the foundation of the present and future wealth and prosperity of the people. These grazing lands are adjacent to the valleys, making combined stock raising and farming the natural method of the development of the industries of the county. It is estimated that 300 square miles of the land in this county can be irrigated, of which not more than 15 square miles are now under cultivation.

The soil of the valleys is generally a rich black loam that produces abundant crops of grain, grasses, vegetables and root crops. It is said by some that corn can be grown, but experiments have not yet fully determined that it can be profitably raised. In the lower Missouri valley water melons are grown to perfection. The average snowfall is light—from four to six inches; wood is plentiful along the streams and water is obtained in wells at from 10 to 50 feet. The Missouri river forms the southern boundary of the county and there is room for a large number of farmers in the valley along this river.

The Great Northern railway traverses the county from east to west, having 204 miles of track in the county.

Glasgow, the county seat, is a prosperous town situated on the line of the Great Northern railway, and has a population of 700. It has graded schools, three churches, stores, hotels, bank, newspaper, court house and round-house and railroad shops. It lies in the valley of the Milk river and is headquarters for a large stock raising country. Some lands in the vicinity are under cultivation and some crops are raised.

Malta, the second town in size in the county, is a thriving town of 300 people. One of the stock-yards of the Great Northern railway is located here and from 30 to 40 trainloads of cattle are annually shipped to eastern markets. A sheep-shearing plant operated by steam is one of the features of Malta, and more than 200,000 sheep are sheared annually and the wool shipped east.

Saco is the center of a large stock raising district, and is supplied with schools, stores, etc. Considerable land around Saco has been brought under irrigation and large crops of hay are raised and fed there. Little was done in the way of irrigation until about five years ago, attention having been devoted exclusively to the raising of stock. Since that time much progress has been made and considerable areas irrigated, and the crops best adapted to the soil and climate determined.

Other towns along the railroad are Nashua, Hinsdale, Culbertson and Poplar. The agency of the Ft. Peck Indian Reservation is located at Poplar and a sub-agncy at Wolf Point.

Wild game is yet abundant in this county.

Valley county has room for thousands of industrious men and will welcome cordially all who seek a home within her borders. The climate is healthy and vigorous, the resources are abundant and there is no reason why a man should fail who labors industriously and energetically for success.

Yellowstone County.

The area of Yellowstone county is estimated at 4,500 square miles, which includes a part of the Crow Indian Reservation. The assessed acreage in the county is now 829,459 acres. The county derives its name from the Yellowstone river, which flows through it. It is essentially an agricultural and stock growing county, having no mineral resources. The agricultural areas are fertile, and a large proportion has been irrigated and is very productive. It is estimated that 100 square miles have been irrigated and that there are several times that area that may be. The ele-

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vations of the valleys range from 2,500 to 3,500 feet, and the soil varies from a sandy loam to "gumbo," and from a few inches to 40 feet in depth. The soil requires irrigation to insure profitable cultivation. Corn and all grains, grasses, vegetables and root crops yield abundantly. Alfalfa is one of the most profitable crops grown in this valley. Three crops are often cut in one season, and yielding from four to six tons per acre. Oats run from 50 to 125 bushels per acre, wheat 35 to 40 bushels, and other grains in proportion. Barley culture has been extensively pursued for several years and the larger part is sold east for malting. The dry weather which prevails during harvest is peculiarly favorable to barley culture, as rain discolors the grain and renders it unfit for malting. Flax is also grown successfully and farmers are encouraged to make it a staple crop. Potatoes attain an unsurpassed perfection. Small fruits are grown in all the valleys and yield largely. Their culture has paid well and the farmers are every year devoting more attention to their production. The experiments in the growing of apples, grapes, plums and cherries proving successful, many orchards are being planted, promising to make Yellowstone one of the fruit counties of the state. Strawberries attain a size and flavor unsurpassed. The rapidity with which vegetation responds to the genial influences of warmth and moisture is marvelous, and the productiveness of the soil excites the wonder of those unaccustomed to farming operations under the influences of irrigation.

The greatest industry of the county has been stock raising. More than three-fourths of the county is grazing lands and great bands of sheep and herds of cattle have grown and fattened on the ranges. In 1898 there were assessed in this county 158,647 sheep, valued at $393,568; 20,833 cattle, valued at $421,235; 6,491 horses, valued at $76,296; 1,963 mules, valued at $51,196, an aggregate stock valuation of almost one million dollars.

With the bringing of the lands under cultivation and irrigation, more attention will be given to combined farming and stock raising.

Much attention has been paid in this county to the improvement of their stock by the cattle and sheep men, and the more improved strains have been imported. The Burlington & Missouri River railroad enters the county from the south, having 47 miles of road in the county, with the terminus at Billings. The Northern Pacific crosses the county east and west and has 101 miles of track in the county.

The State Arid Land Commission has completed a survey for a large canal, intended to divert the waters of the Yellowstone to the bench lands east of Billings, which if accomplished will open up rich and fertile lands that will furnish homes for thousands of people.

Billings, the county seat, is a beautiful and growing town of 3,000 inhabitants, situated on the banks of the Yellowstone on the line of the Northern Pacific railway. It is also the present terminus of the Burlington & Missouri River railroad. Billings has graded schools and many churches, wide and improved streets, water works, electric lights, good public buildings, and is a very desirable residence and business city. It is an important shipping point for cattle and wool, and has tributary a large agricultural and grazing country, including the Musselshell and Yellowstone valleys. Both the Northern Pacific and Burlington railroads have large and ample warehouse accommodations, the wool warehouse of the latter being the largest in the United States. Both companies have wool presses for the accommodation of shippers and they have commodious stock yards for loading cattle, sheep and horses. The illimitable supply of power which the water of the Yellowstone is capable of furnishing, the great quantity of excellent coal in the adjacent county of Carbon, the fertility of the soil of the surrounding country and the excellent railroad facilities, all indicate that here must soon be a thriving center of manufacturing industries.

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THE MONTANA FARM.

How to Farm in Montana and Make It Pay—What 160 Acres of Irrigated Montana Land Will Produce.

The following article from Prof. S. M. Emery, director of the Agricultural Experiment Station at Bozeman, on how to farm in Montana, and what a 160-acre irrigated farm in this state can be made to produce, based on a conservative estimate, will be of material value to every reader and is an authoritative and disinterested statement showing the advantages enjoyed by farmers of this state from the standpoint of the productiveness and strength of the soils and the climatic conditions that prevail. The article is as follows:

The impression is fast gaining ground in business circles that large farms are not desirable from a business and social standpoint.

The bonanza farming of the Red River valley adds but little more to the wealth of the locality in which it is located than do the bands of cattle and sheep which exist upon the open range of Montana and whose owners and interested dividend drawers therefrom are frequently non-residents. It will be long before the clientage resident in villages, towns and cities, who gain a livelihood in large part by being middlemen between the producer on the one hand and the consumer on the other, can be eliminated from the business problem. There is no good reason why they should, and clearly from their standpoint it is to the public interest that the farming population be augmented by smaller subdivisions of farm areas than are now the rule in Montana.

Under either of the two systems—exclusive grain culture or exclusive stock growing—much can be accomplished by comparatively little labor. The tracts employed in stock growing are usually apportioned between pasture lands and hay meadows, the work of neither employing large crews of men.

Again in parts of Montana the summer-fallow system is practiced and by this a third or a half of the lands under cultivation is left idle each season to be plowed during the months of June and July after the spring crops are sown and before the season of hay harvest.

This, too, is prejudicial to the interests of the state, as must be any system which causes to lie idle any considerable portion of farm lands each season, upon which taxes must be paid, and if, as is too often the case, they are mortgaged, other and producing property must be taxed to pay the annual interest charge.

Too many people are imbued with the feeling that they, and they only, are concerned in the management of real estate which happens for the time being to stand in their name, in spite of the fact that it existed for ages before they were on earth and that it will be here centuries after their flesh and bones have crumbled to dust.

The ownership of lands carries with it a duty to our fellows and to posterity, which cannot be gainsaid. It is ours to handle to the best advantage and we cannot discharge this duty upon any lines save those of the greatest production commensurate with the conservation of soil fertility. How this may best be done is one of the most important of agricultural problems. Beyond doubt the annual cropping of the soil is along this line, for notwithstanding the apparent gain in crop yields under summer-fallow as against annual grain cropping, it is a fact scientifically determined that this stimulus is an unnatural one and that in time great loss of valuable mineral properties from the exposure of the bare soil to the summer winds and fall storms is bound to work serious impairment of value to land.

Crop rotation is left as the only intelligent method of farming, as it is out of the question to annually apply farm manures to so extended farm areas, as rapidly as the resultant good effects therefrom are consumed. Do not understand that manuring of land is decried—not at all; all of this sort of work should be done that is possible, but where one undertakes to apply barn yard manure at the rate of twenty loads per acre, it becomes a sizable task when between 3,000 and 4,000 loads are required to a quarter section of land.

Nor have many Montana farmers the living machines for manufacturing farm yard manures in such amount, i. e., the cattle or farm animals and the grain, hay and roots to be transformed into available plant food; so that it becomes a matter of necessity to formulate such a system as will be a combination of stock growing and hay, grain and root tillage, with the distinctive plan in mind of feeding out upon the farm a large per cent of grain, and all of the hay and roots. The 160-acre farm should be subdivided into 40-acre tracts, each of which should be fenced with such a fence as will permit the ranging of swine and sheep, as well as cattle inside each field. Fencing machines strongly built, cheap and easy of manipulation, are manufactured, and smooth wire of suitable sizes is sold at so low a price per pound that these stock-proof fences can be constructed at half the former expense of the cumbersome old rail and wire leaning fences which used formerly to mar the Montana landscape in all directions in the settled portions of the state. Again, the red cedar is indigenous to much of Montana, and a good taut closely woven smooth wire fence built on peeled red

cedar posts is a neat, durable and substantial barrier to your own or your neighbor's stock. The question may be pertinently asked, why fence the entire farm for stock? Why not have pastures securely fenced, using a four-strand barb wire fence on balance of farm? Simply that the whole farm is designed to be pastured in its turn during the twelve months.

Montana is extremely dry, as a rule, during and immediately preceding grain harvest, and the loss in shelled grain from this cause is too great to be afforded unless the fields are fenced so that swine may be turned in between harvest and fall plowing to glean the fallen grain, and this they will do to perfection if given the opportunity. The fields divided into 40-acre tracts it will well pay you to subdivide again into 20-acre tracts), there should be plans made to produce hay (preferably of alfalfa, clover or alsike), wheat, oats, barley, peas and roots, on about the following areas:

40 acres devoted to hay.
20 acres devoted to wheat.
20 acres devoted to oats.
40 acres devoted to barley.
20 acres devoted to peas.
5 acres devoted to potatoes.
2 acres devoted to sugar beets.
3 acres devoted to mangel wurzels.
5 acres devoted to swine, clover pastures.
5 acres devoted to roads, buildings, corrals, etc.
—160

We will suppose that the land was of average quality and had been summer-fallowed the preceding year. The first year there might be 80 acres seeded to barley, of which 40 acres could be sown to clover, alfalfa or alsike, or an equal number of acres to each; they are all valuable forage plants and good yielders.

The following amounts of seed per acre are ample: of clover and alsike, 7 pounds; of alfalfa 20 pounds. Do not sow with grain—that is, do not mix seed in seeder with seed grain, but sow the clover seed subsequently, using any one of the reliable hand sowers, broad-casting the seed on the surface. If the grain is sown with a drill, it is well not to harrow until the clover seed is sown, then across the drill marks with a Scotch harrow, a light single harrowing. Of course it takes time to inaugurate a rotation system.

It will be found a valuable thing to do, if water is abundant, to seed the entire 80 acres of barley to clover, irrigating the barley twice before cutting, and once immediately after. Should this be done apply the first irrigation as soon as the grain covers the ground; the second, just before the grain begins to head, and the third irrigation just as soon as the grain is cut and hauled off for stacking, say within two weeks after barley harvest; the result will be, under normal conditions, a growth of clover 12 inches high; this will bloom just before frost and will make a splendid fall pasture or a green manure crop of great value to be turned under. These crop yields ought to result as follows: 80 acres barley, 4,000 bushels, 200,000 pounds; 20 acres wheat, 800 bushels. (Spring Club.); 20 acres oats, 1,500 bushels; 20 acres peas, 600 bushels; 5 acres potatoes, 1,500 bushels; 2 acres sugar beets, 60,000 pounds; 3 acres mangels, 1,500 bushels.

The crops for sale are worth at normal prices:

4,000 bushels barley at 50 cents	$2,000.00
800 bushels wheat at 50 cents	400.00
1,500 bushels potatoes at 25 cents	375.00
Gross returns of sale of crops from 125 acres	$2,775.00

Upon the five acre swine pasture sow spring rye early in April, seeding with this alfalfa at the rate of 20 pounds per acre; give a good irrigation about the 25th of May, and by June 15th there can be safely turned to this pasture six grade Berkshire and Poland China sows and their first litters of pigs. These sows should each bring two litters of pigs per annum; or eighty head of swine annually, estimating seven pigs to the sow at each litter—as a matter of fact they will average more than eight in number per litter. Turning these sows with the first litter into the pasture by June 15th, they will then gain a complete subsistence from the rye and alfalfa; should there later be a shortage in feed, it can be supplemented with peas cut just as they are beginning to harden and fed in racks in the swine pasture (and it will surprise eastern pea growers to see how long it will take 50 swine to consume peas grown on a Montana acre of land, where pea vine growth often attains a length of 12 feet.) They will consume probably two acres of peas by the time harvest is over and can then be turned into the fields to glean. (We have had a herd of 50 head of shoats average a growth of 10 pounds each per week for six weeks in the fall on grain fields.) The 18 acres of peas will yield 540 bushels peas and 70 tons good winter forage for cattle, sheep or horses. These 540 bushels of peas with the 1,500 bushels of mangel wurzels and the sugar beets will fatten the first litters of 40 head of swine in December and the same number the following July (the date when the second litter will be ready to turn off) and the swine should at this age average 175 pounds and be worth at the current rates for pork $10 per head, or a revenue of $800 for swine, these bringing the receipts of the 160-acre farm up to $3,600, or $22.50 per acre.

The clovers—red, white, alsike, alfalfa and peas are legumes and potent introducers into the soil of the most expensive chemical fertilizer known to the farmer—

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namely, nitrogen. Following these crops, the following year may be produced better grain crops than can be harvested from the best summer-fallowed land, and by following this plan year after year, alternating the wheat, oats and barley, the lands which produced clover, peas and roots the preceding year, it will be entirely feasible to duplicate these ordinary yields and prices for an indefinite number of years. We submit that no man is entitled to sympathy who can show gross receipts per acre of $22.50 per annum, when the usual average of the United States is less than $6. No account has been made of the disposition of the 40 acres of clover hay, easily capable, after the first year, of the production of 100 tons of hay worth $5 per ton, nor of the 75 tons of pea-forage, worth $1.50 per ton, as compared with clover, or of the good, clean, bright straw from the 80 acres of grain. If the grain is stacked and also the threshed straw, this is worth easily $1 per ton, and at the rate of a ton per acre (a safe estimate), $80 can be realized for a crop which is too often consumed by fire to the actual detriment of the land. But speaking within bounds, after providing for the forage wants of the six horses required to farm this land, and of the four cows, which self-respect should require to be on each farm for the supply of milk and butter there consumed, the residue forage ought to be adequate to the stall fattening of 40 steers, which should pay a profit of at least the estimated value of the forage crop $600 for the added value for feeding such a ration during the three winter months.

Should it not be possible to procure steers to be fed, lambs would pay quite well, or aged wethers, or open range stock, say 100 head, can usually be contracted for winter feeding, at $1 per month, or $500 for such a herd.

The benefit arising from their droppings will easily offset the value of the labor in feeding in any case. This profit, added to the other farm receipts, will bring the gross revenues up to $4,200, certainly a favorable showing to be produced on 160 acres of land.

Facts About Montana Libraries.

BY FRANK C. PATTEN,
Librarian Helena Public Library.

The condition of education in Montana may be judged somewhat from the facts concerning the libraries of the state. Hon. William T. Harris, for many years United States Commissioner of Education, has recently said: "The public library is recognized as one of the great forces in modern educational progress." Commissioner Harris' Report for 1896, containing his last general report on libraries, shows that in five years there has been an increase in number of volumes in Montana libraries of 227 per cent. This was greater than the increase in any other state. According to library statistics gathered with considerable pains by the present writer, Montana libraries have about doubled in number, size, and use since July, 1895, a period of four years. The number of public libraries, using this term in a broad sense, has increased from 25 to nearly 50. The number of volumes has grown from less than 80,000 to nearly 160,000. This includes school libraries, which have grown from less than 8,000 to 16,500 volumes. The yearly loans for home use from the Montana libraries of 1895 were about 170,000; the annual loans are now nearly 300,000. The use of books and periodicals in the library buildings has grown correspondingly. In the United States there are now about 300 libraries having over 25,000 volumes. Two of these libraries are in Montana. In 1896 there were about 35,000,000 volumes in public libraries of the United States, the average being about 50 volumes for each 100 of the population. The average in Montana is about 70 volumes for each 100 people. The following table gives in round numbers the number of volumes in the

LIBRARIES OF MONTANA.

	Number of Volumes	
Anaconda:—Hearst Free Library		5,500
Belgrade:—Public Reading Room and Library		300
Belt:—Free Public Library		900
Boulder:—Library of Montana State Deaf and Dumb School		200
Bozeman:—Bozeman Free Library	6,000	
Library of Montana State College of Agriculture	6,000	
		12,000
Butte:—Butte Free Public Library	25,500	
Butte Fire Department Library	500	
Pioneer Library (Knights of Labor)	500	
Butte Miners' Union Library	600	
Stationary Engineer's Library	300	
Canadian Institute	300	
Scandinavian Free Library	200	
Christian Science Reading-Room and Library	100	
		28,000
Columbia Falls:—Library of Montana State Soldiers' Home	500	
Deer Lodge:—College of Montana Library	4,000	
Montana State Prison Library	1,200	
		5,300

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Dillon:—Dillon Public Library	2,000	
Montana State Normal School Library	2,500	
		4,500
East Helena:—Public Library and Reading-Room		800
Great Falls:—Valeria Public Library		6,000
Helena:—Montana State Library—Historical and Miscellaneous Dep't	12,000	
Montana State library—Law Department	10,000	
Montana State Bureau of Agriculture, Labor and Industry—Office Library	1,500	
Montana State Superintendent of Public Instruction—Office Library	600	
Montana State Board of Stock Commissioners—Office Library	200	
Library of Montana Society of Engineers	200	
Library of Medical Association of Montana	400	
United States Weather Bureau—Office Library	200	
Helena Public Library	27,700	
Helena Fire Department Library	500	
Montana Wesleyan University Library	1,000	
Sacred Hearts Library	1,000	
Montana Diocesan Library (Roman Catholic)	2,000	
Saint Vincent's Academy Library	1,000	
Montana Grand Lodge Masonic Library	1,500	
Montana Club Library	1,000	
		60,800
Kalispell:—Public Library		1,000
Miles City:—Library of Montana State Reform School		100
Missoula:—Missoula Free Public Library	5,000	
Montana State University Library	6,000	
		11,000
Red Lodge:—Public Reading-Room and Library		300
Sand Coulee:—Sand Coulee Library Association		2,000
Twin Bridges:—Library of Montana State Home for Orphans	100	
Public Library	800	
		900
White Sulphur Springs:—W. C. T. U. Library		500
Montana School District Libraries		16,500
Total		157,000

Several of these libraries are supported with the money of the state. There is the state library (two departments) with its 22,000 volumes and 10,000 pamphlets. And there are libraries at the State University, the State College of Agriculture and Mechanic Arts, and the State Normal School. The State Prison, Reform School, Deaf and Dumb School, Orphans' Home and Soldiers' Home have each managed to acquire small libraries without the use of state money. The College of Montana, Montana Wesleyan University and Saint Vincent's Academy are private educational institutions that support libraries for the use of students and faculty. There are a number of libraries supported by library associations, clubs and other organizations. Of public libraries in the strictest sense, that is, those supported by cities and towns with public money, and made free to all the residents, there are now six in Montana. The cities of Butte, Dillon, Helena and Missoula each devote a tax of one mill on the dollar to the support of their libraries. Bozeman and Great Falls do not set apart as much as this for their libraries. Billings will this summer (1899) complete the organization of her public library, which is to occupy a fine memorial building. Livingston and other places are agitating the project of forming public libraries. The best library buildings in the state are those at Anaconda and Butte. Helena and Great Falls have good buildings, but too small.

Montana Railways.

Being the pioneer railway line of Montana, the Northern Pacific railway traverses perhaps the richest portion of the state, especially considered from an agricultural standpoint. Along its entire length, as is shown by the accompanying maps and the descriptive articles of the several counties, there are the broadest and the richest valleys that hold out their tempting inducements to the settler, whether he is looking for railroad land grant lands to purchase, improved farms or to locate on free government lands. As this line offers a through route from any eastern point, and with the first equipment and the most modern conveniences, it can also offer to carry the intending settler to the choicest location for farming or other industrial occupation.

One of the chief features of agricultural improvement that is occurring along the route of the Northern Pacific is the irrigation of the several districts under the immediate auspices of the State Arid Land Grant Commission. Under this plan the lands will be opened to settlement and the farmer will be charged only the actual cost of establishing the system, with ten-year payment, and will be given his irrigation at just what it costs to maintain the system.

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But along the line of the Northern Pacific, as it traverses the state from east to west, there are not only the choicest opportunities offered for the farmer and the stock-raiser; there are unparalleled opportunities in almost every industrial and business line. Passing the purely agricultural and stock counties of the eastern portion of the state, Carbon presents the same advantages, but adds to these the extensive mining of a high-grade coal, a number of large corporations now being engaged in this enterprise, and the indications are that the production of oil will shortly be added to the county's production of wealth and the affording of extensive employment and the investment of capital. In Sweet Grass county, beside the attractive farming opportunities, there is both gold and coal mining, and the mines of the southern part of the county warrant the assertion that they are not only becoming extensive producers of the precious metal, but that they are going to be permanent. While Park county has its rich agricultural valleys, its many hills are filled with mineral and its gravel beds afford the richest placers. The mountains of this county are rich in their deposits of gold, silver, lead and copper, and the mining of these is being carried on extensively and with continued increase. The counties of Gallatin, Broadwater, Jefferson and Lewis and Clarke are all prominent mineral producers. Passing through these counties the Northern Pacific gives communication with every important point, together with Helena, the capital of the state, and Butte, "The Greatest Mining Camp on Earth." As the pioneer line, the Northern Pacific felt its way along ahead of civilization and selected a route that not only takes in the scenic beauties of the mountain state, but also traverses the broadest and the most fertile valleys and touches the richest mineral districts.

Besides the main line, the Northern Pacific has fifteen branches that extend north and south into different portions of the state, all heavy feeders for the trunk line. The more important of these branches are the Rocky Fork line, that runs from Laurel to Red Lodge, with a spur from Gebo to Willets, traffic for the branches being furnished by the extensive coal mines of these towns; the Cokedale branch, that runs from the main line a short distance to the coal mines and coke ovens of Cokedale; the Red Mountain, that connects the rich mines of Rimini with the main line at Helena; the Boulder branch that runs south from Helena to Boulder, the county seat of Jefferson county, tapping the rich and highly cultivated Boulder valley, and furnishing transportation for the wood that is taken from the neighboring mountain sides and marketed in the smelter towns and other cities of this part of the state, and an extension runs from Boulder to Elkhorn. The branch that connects the Yellowstone National Park with the main line runs from Livingston to Gardner, at the northern line of the park. The Butte line is a branch of the northern Pacific that runs from Butte to Logan, and the Gaylord and Ruby valley line, that runs from Whitehall to Gaylord, a smelter town. The Red Butte runs from Sappington to Norris and then to Pony. The Marysville line branches from the main line at Clough Junction and runs to Marysville, and the Philipsburg line runs from Drummond to Philipsburg. The Bitter Root branch starts from Missoula and traverses the fertile valley of that name as far as Grantsdale, making one of the most productive sections of Montana tributary to the Northern Pacific. Another important branch of this line is the Coeur d'Alene line, that also extends from Missoula, running in a northwesterly direction to Spokane. The last branch of this line is the Montana Union, that runs from Butte to Garrison.

The main line of the Great Northern traverses the northern part of the state east and west for its entire length, and its most important branch is the Montana Central, which leaves the main line at Havre and runs southwest to Great Falls, and thence in the same direction to Helena and Butte. Branching from Great Falls, the road has lines running to the coal camps of Sand Coulee, Stockett and Belt, and to Neihart, the great silver camp, and to Barker.

The Oregon Short Line runs from Ogden, Utah, north through the southwestern part of the state to Butte, connecting the state with the Union Pacific system.

The Great Falls & Canada runs from Lethbridge, Alberta, Canada, south to Great Falls, traversing a large stock country and connecting the railway systems of the state with the Galt coal mines at Lethbridge.

The Butte, Anaconda & Pacific runs from Anaconda to Butte, and while it is a short line, it can show up more tonnage to the mile the year around than any other railroad in the country. It hauls the raw material to and the finished product from the Anaconda copper smelters.

The Montana railway runs from Lombard, in Lewis and Clarke county, to Leadboro, where there are rich silver-lead mines.

The Big Horn Southern runs south from Billings, connecting with the Burlington & Missouri system.

The Yellowstone Park railway is now under construction. This line will run from Bozeman east over the mountains to the coal mines near Chestnut, and south from Bozeman to the National Park, opening up an entirely new mineral, timber and agricultural district.

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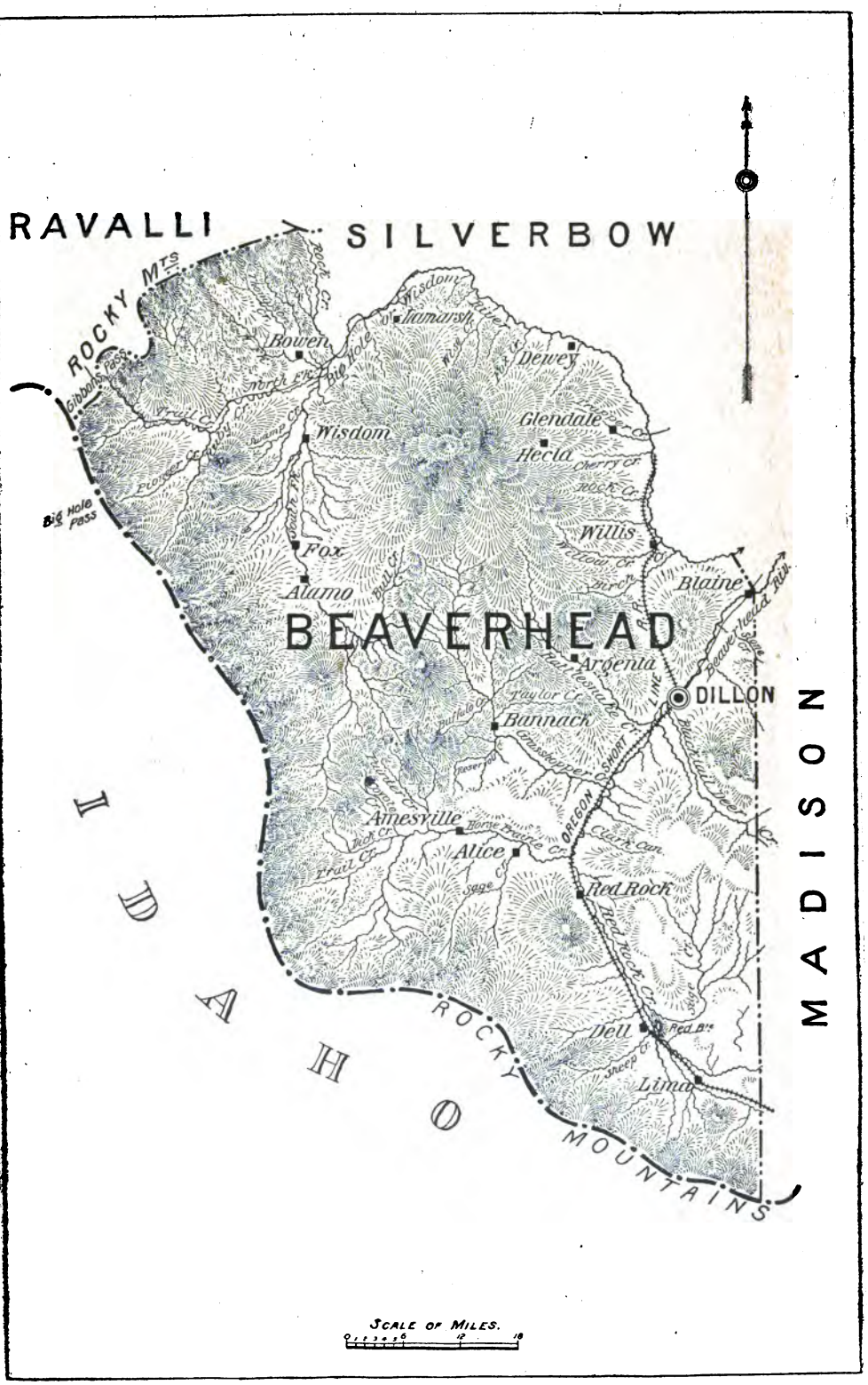

PRINCIPAL FEATURES.

Total area, 4,600 square miles; assessed acreage, 191,592. Resources—Mines, lumber, stock, agriculture. Railway facilities—Utah & Northern. Dillon—County seat, location State Normal School, population, 1,500.

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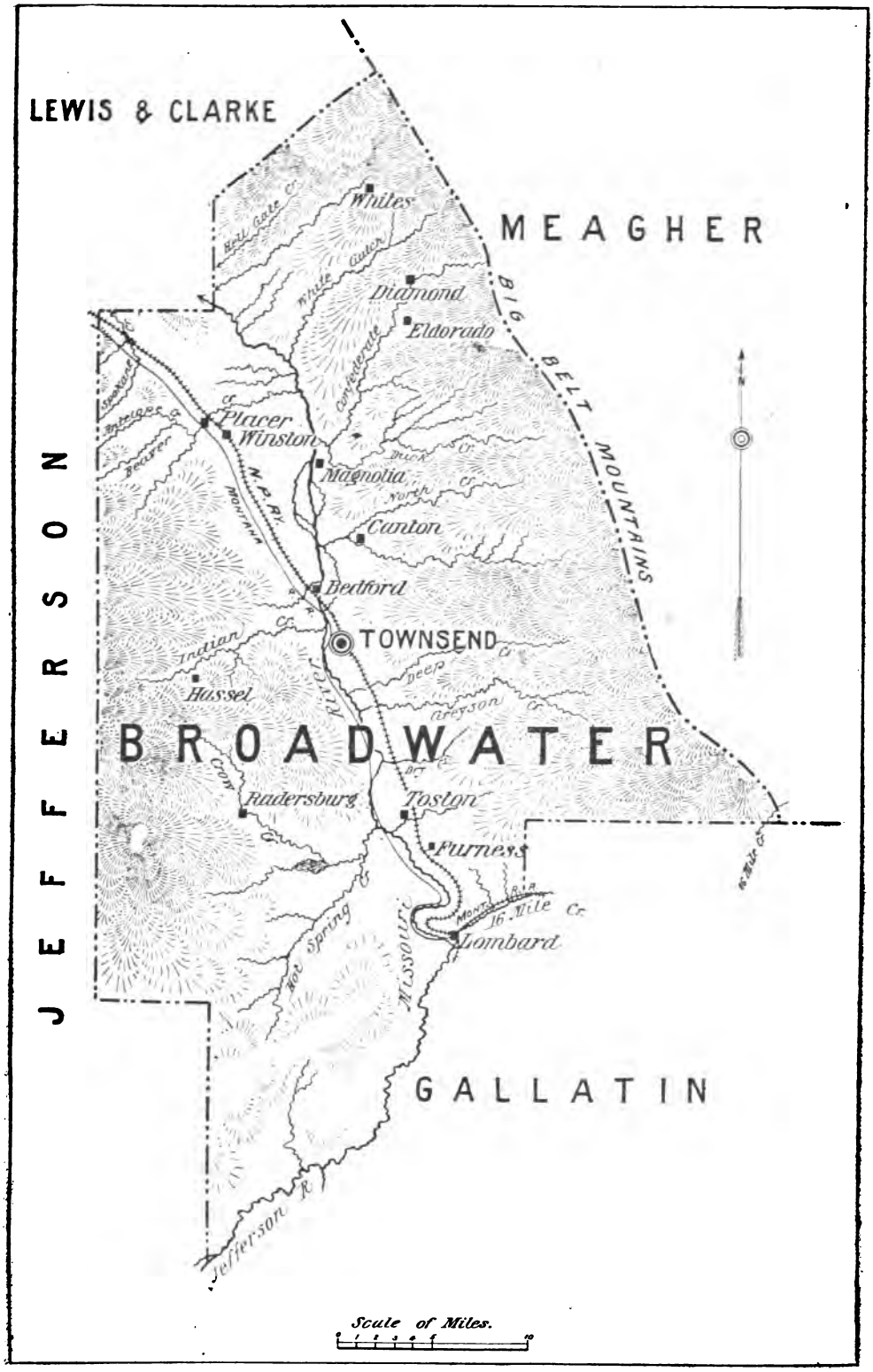

PRINCIPAL FEATURES.

Total area, 2,979,000 acres; assessed acreage, 189,836. Railway facilities—Northern Pacific, Montana Railway. Resources—Mining, stock, agriculture. Townsend—County seat, population 900.

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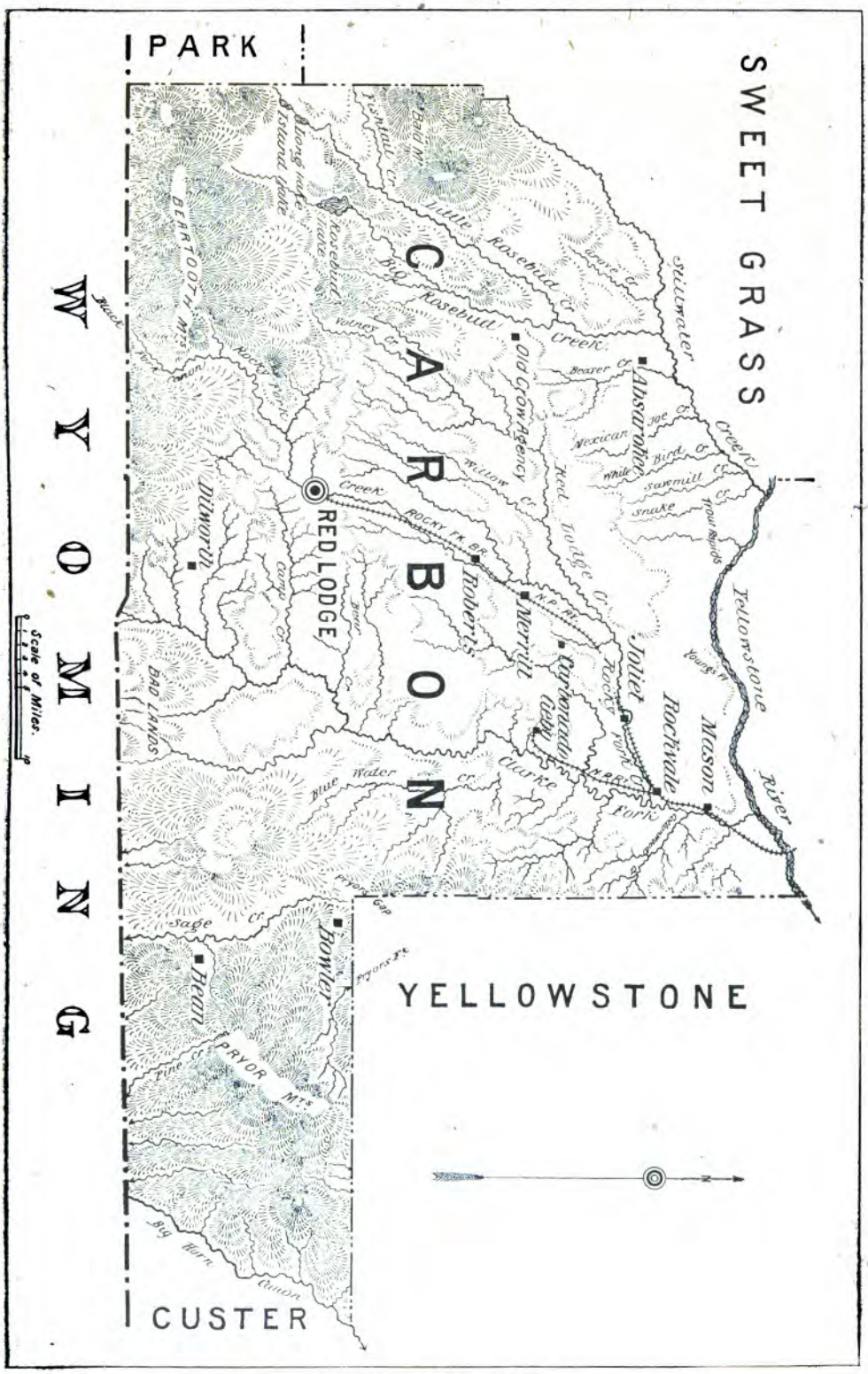

PRINCIPAL FEATURES.

Total area, 3,000 square miles. Resources—Agriculture, stock, mining. Railway facilities—Northern Pacific. Red Lodge—County seat, population 1,500.

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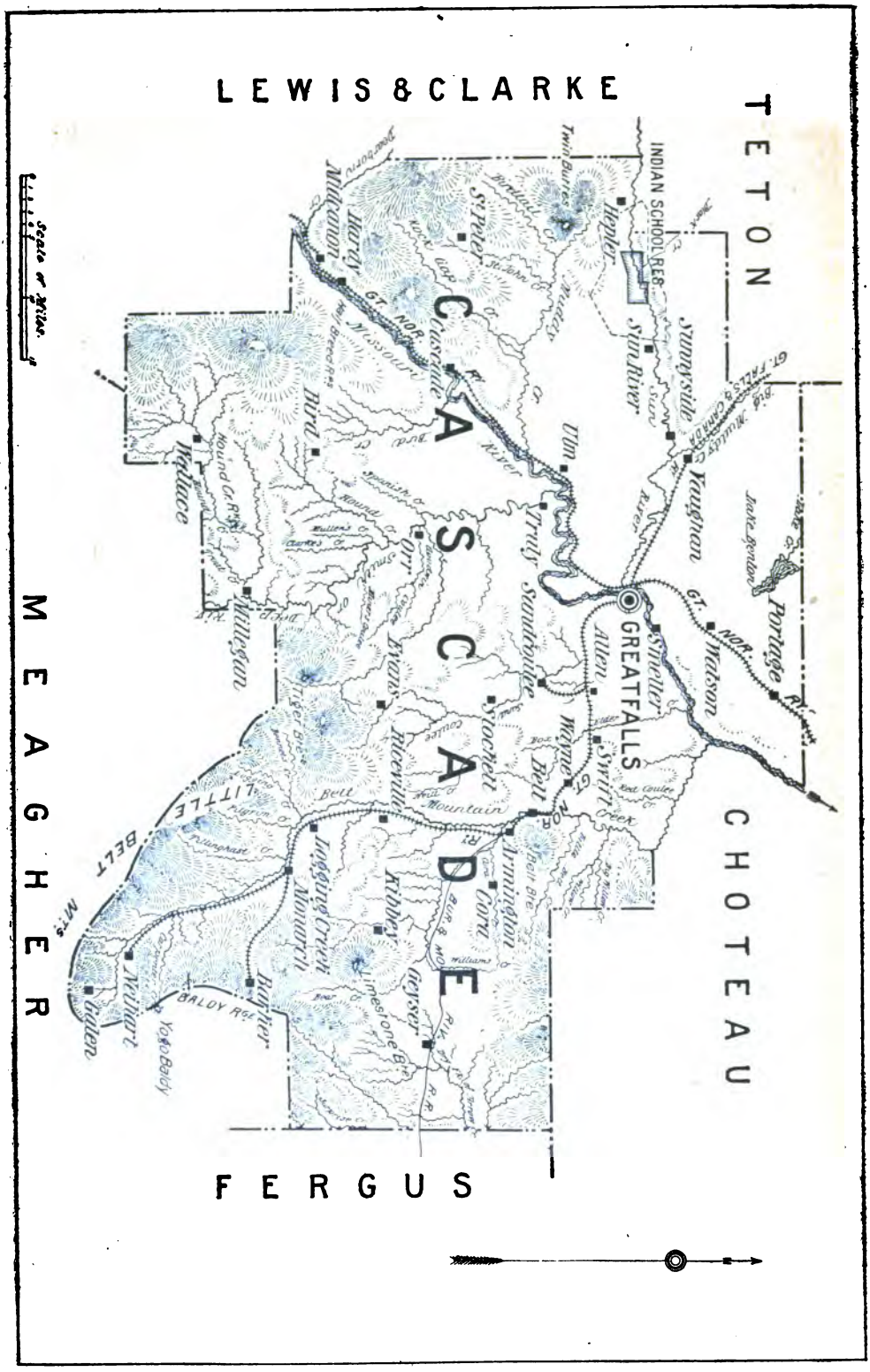

PRINCIPAL FEATURES.

Total area—3,000 square miles; assessed valuation, $13,000,000. Resources--Gold, silver, lead, iron, coal, agriculture, stock, water power, manufacturing. Railway facilities--Great Northern, Montana Central, Neihart & Barker Railway, Sand Coulee & Stockett Railway, Great Falls and Canada Railway. Great Falls--County seat; population 12,000; wool shipments, 8,000,000 pounds; copper and silver smelters and refineries.

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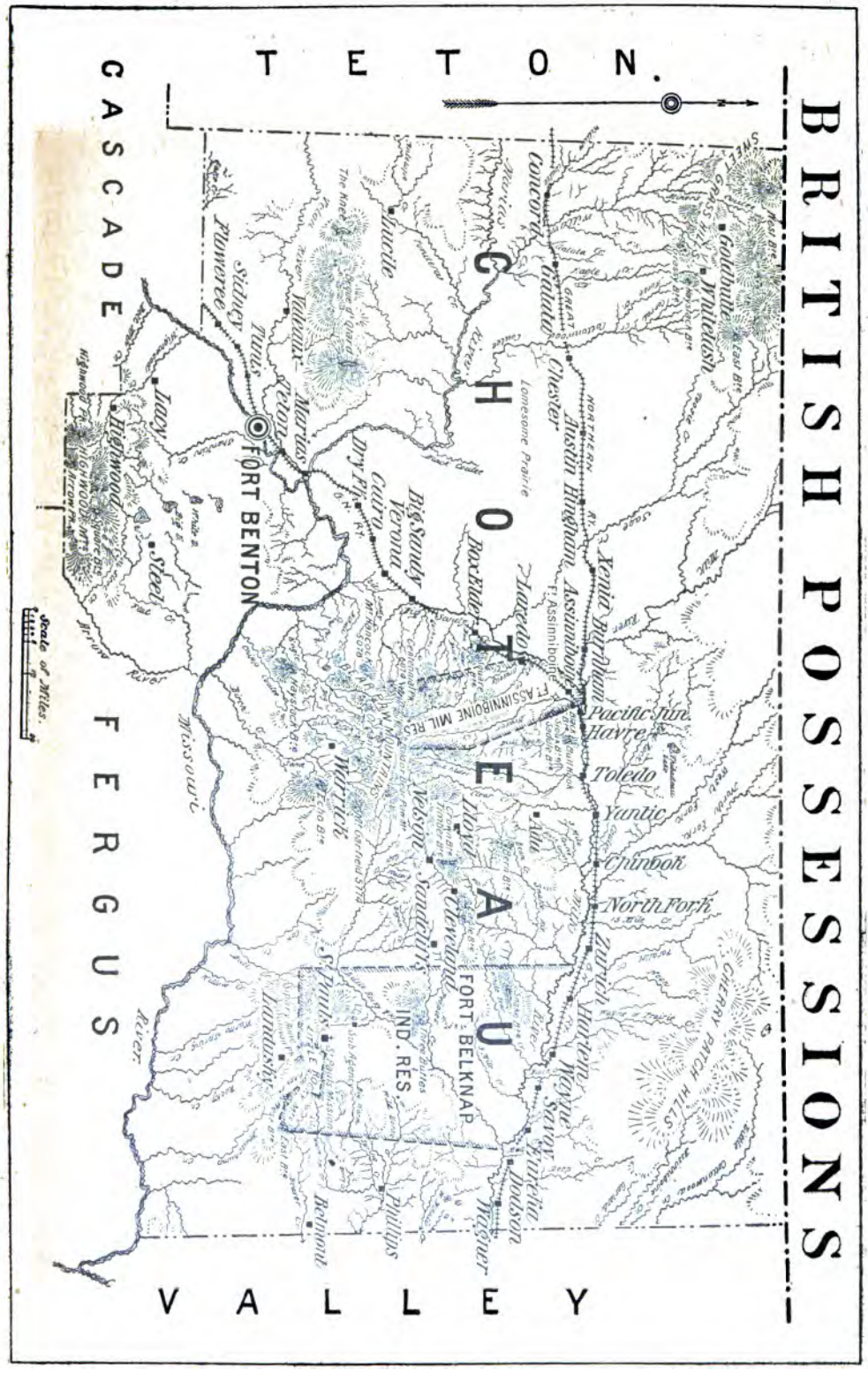

PRINCIPAL FEATURES.

Total area, 10,300,000 acres; assessed, 104,173 acres. Resources—Stock raising, agriculture. Railway facilities—Great Northern. Fort Benton—County seat population 600

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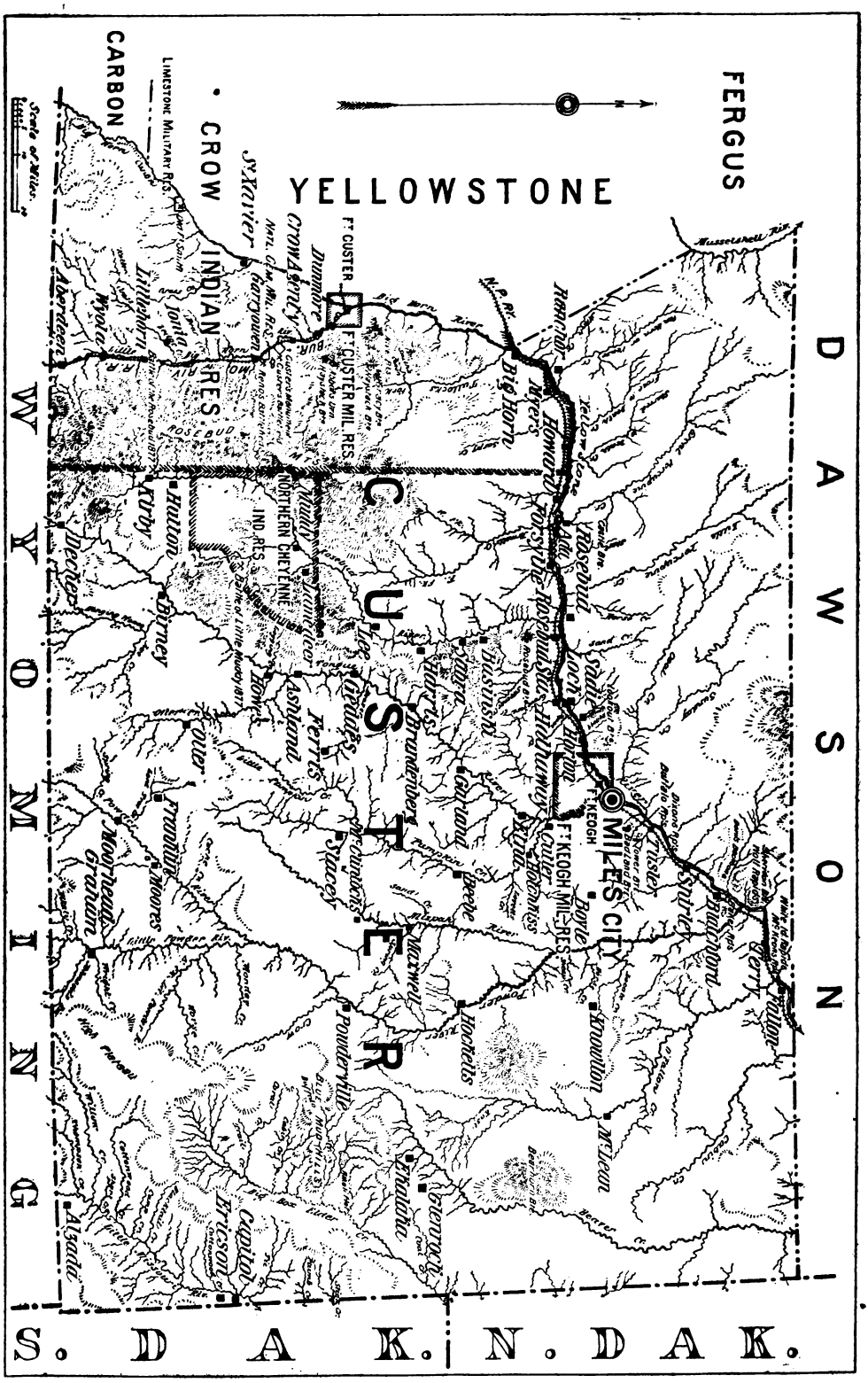

PRINCIPAL FEATURES.

Total area, 26,580 square miles; assessed acreage, 1,123,045. Resources—Cattle, sheep agricultural and horticultural productions. Railway facilities—Northern Pacific and Burlington & Missouri. Miles City—County seat, population 2,000.

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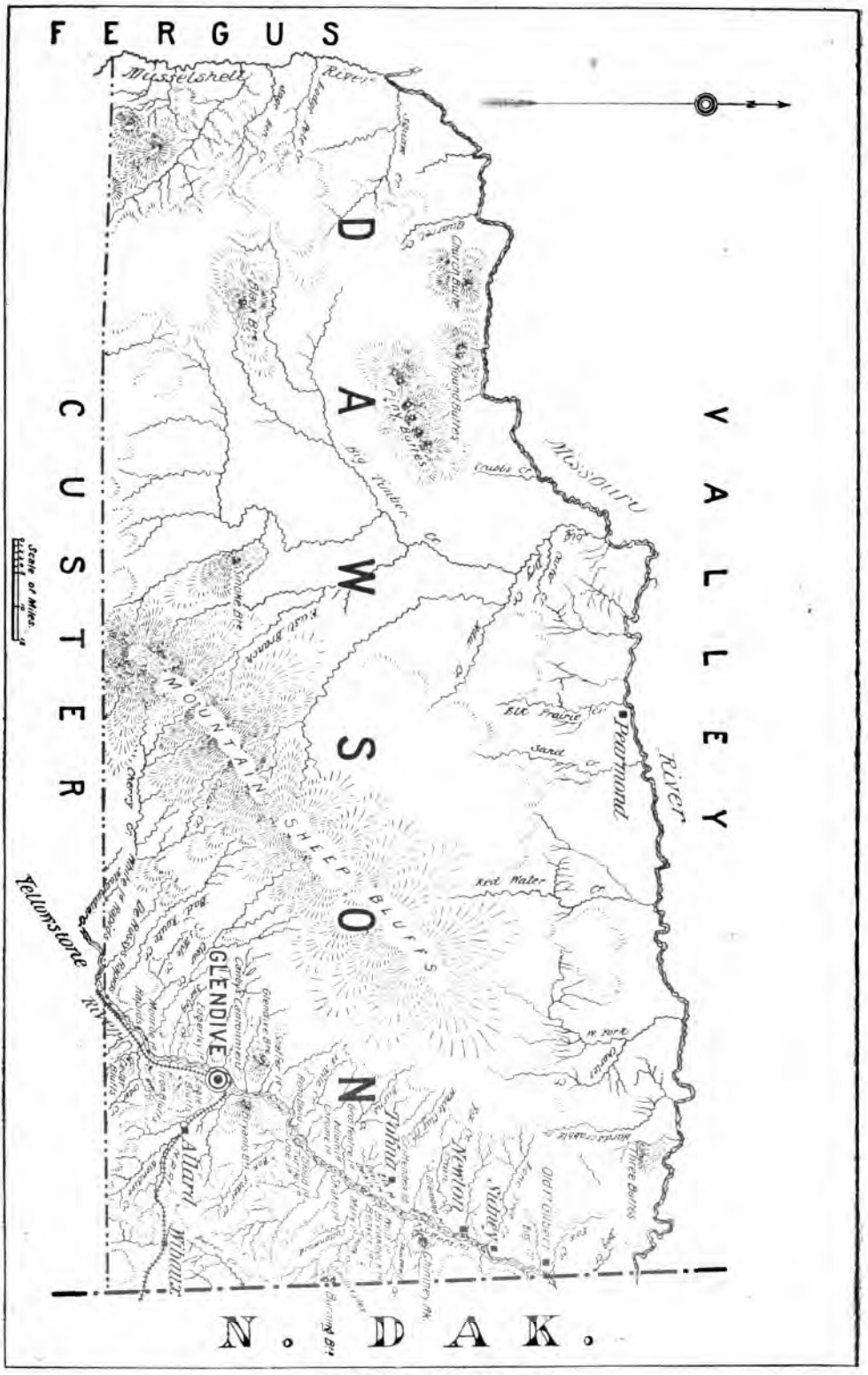

PRINCIPAL FEATURES.

Total area, 8,543,000 acres; assessed acreage, 430,092. Resources—Stock raising and agriculture. Railway facilities—Northern Pacific. Glendive—County seat, population over 1,000.

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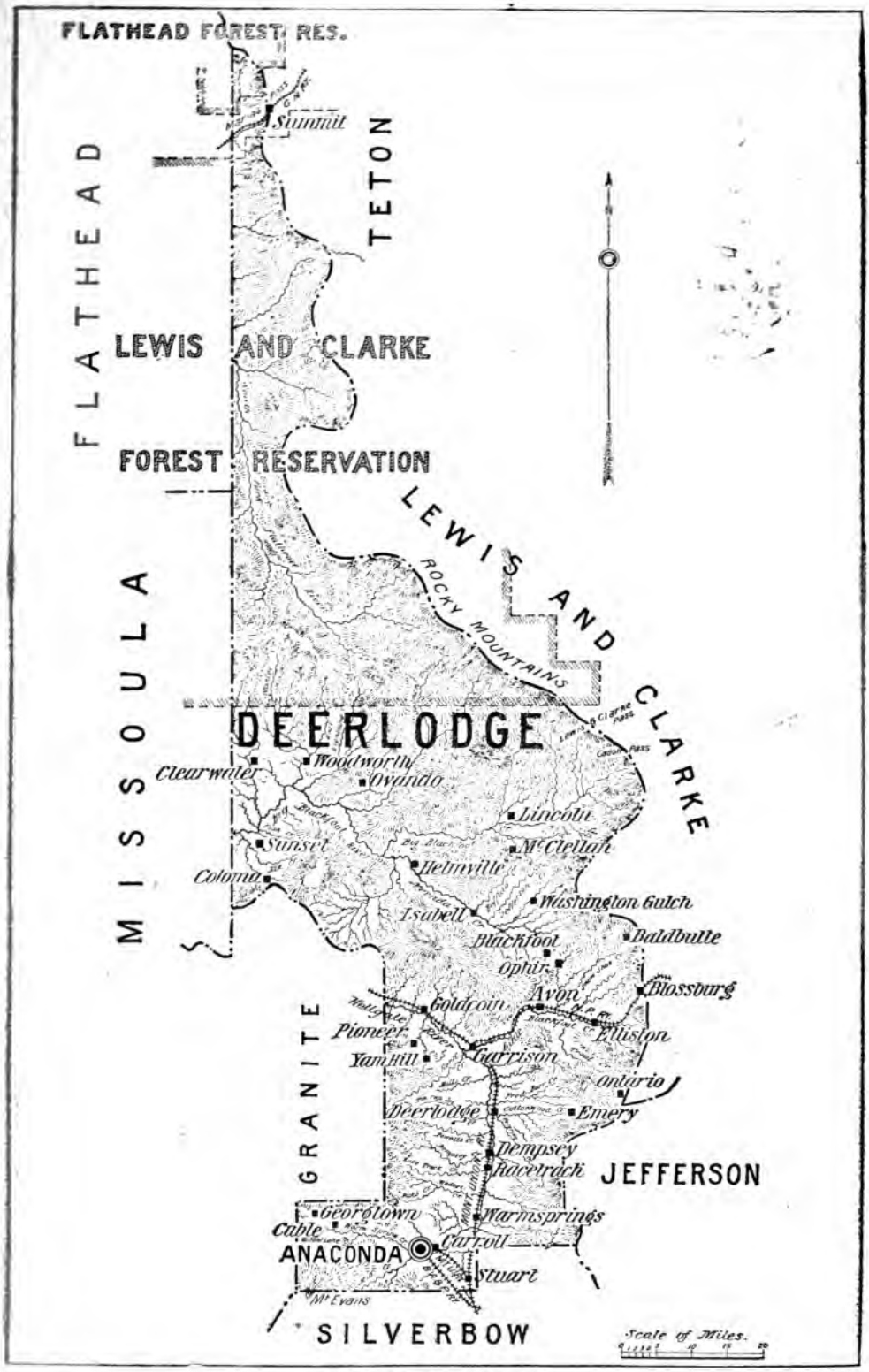

PRINCIPAL FEATURES.

Total area, 2,631,000, assessed acreage, 467,246. Resources—Copper, smelting and refining, mining and agriculture. Railway facilities—Northern Pacific, Gt. Northern, Montana Union, B. A. & Pacific. Anaconda—County seat, population 10,000.

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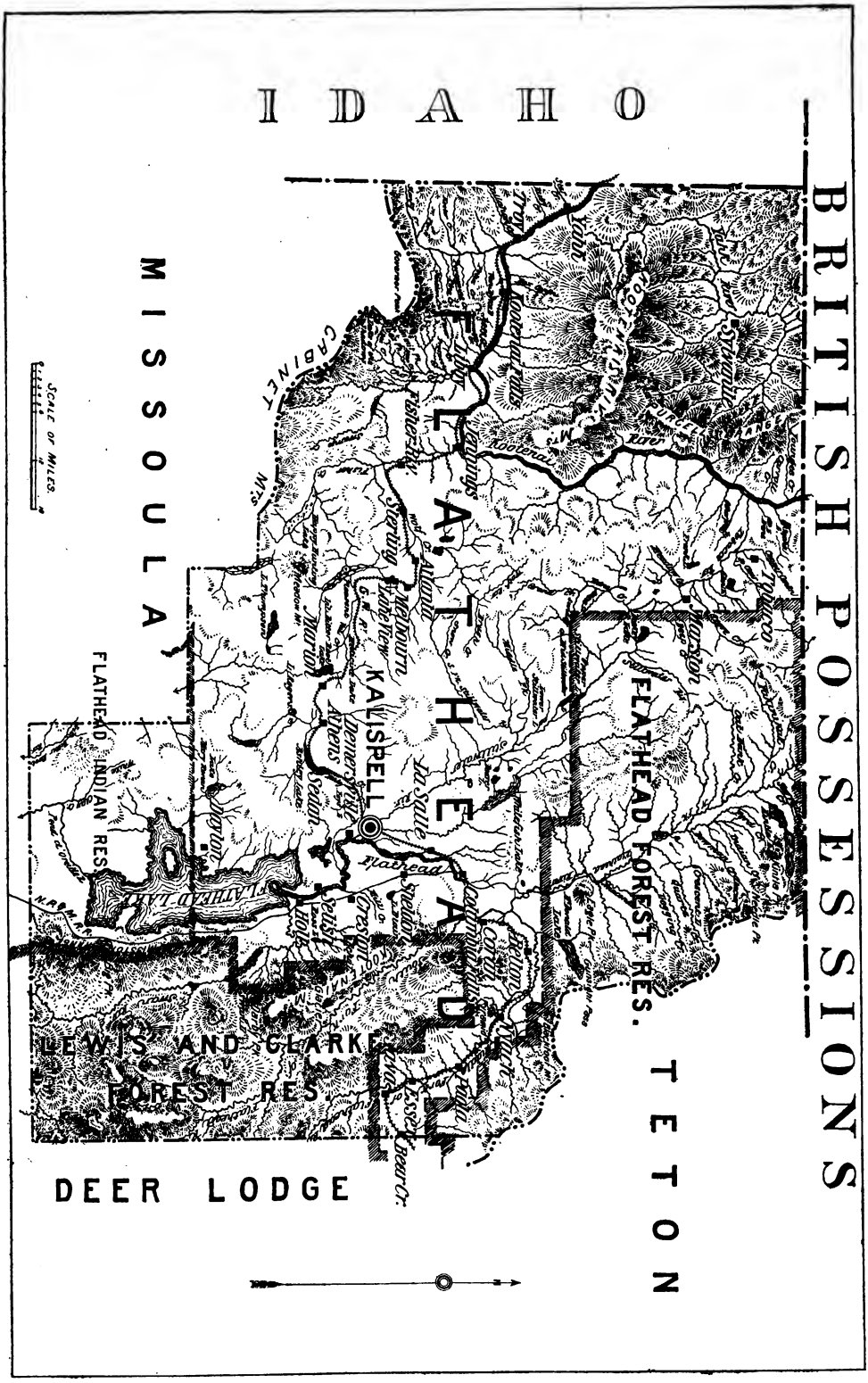

PRINCIPAL FEATURES.

Total area—5,569,000 acres; assessed acreage, 325,626. Resources—Agricultural, horticultural, stock raising, dairying, lumbering, mining. Railway facilities—Gt. Northern. Kalispell—County seat, population 3,000.

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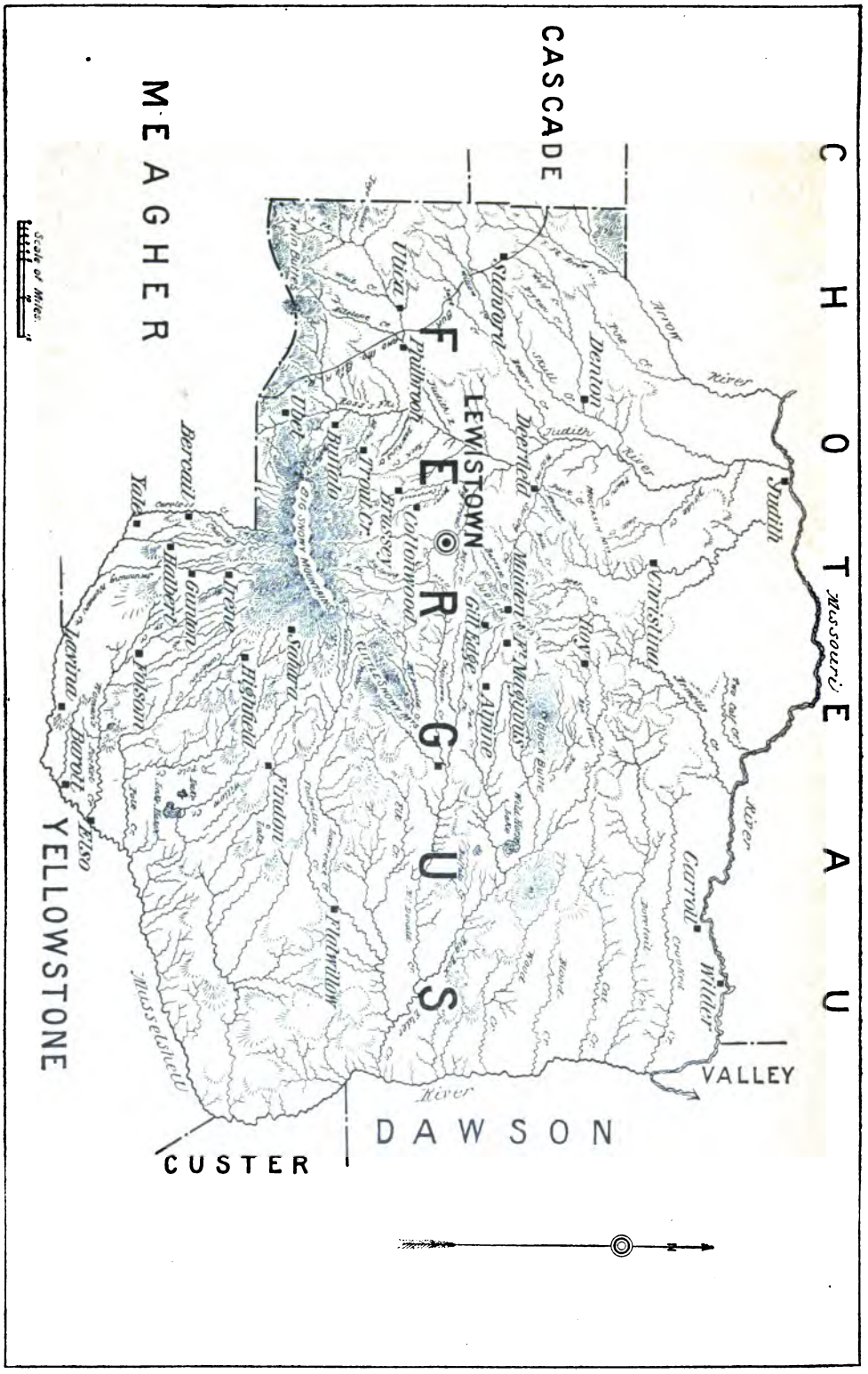

PRINCIPAL FEATURES.

Total area—5,675,000 acres; assessed acreage, 565,278. Resources—Stock raising, wool growing, agriculture, gold mining Transportation facilities—Stage and freight lines between Great Falls, and to Fort Benton and Billings. Lewistown—County seat, population 1,200.

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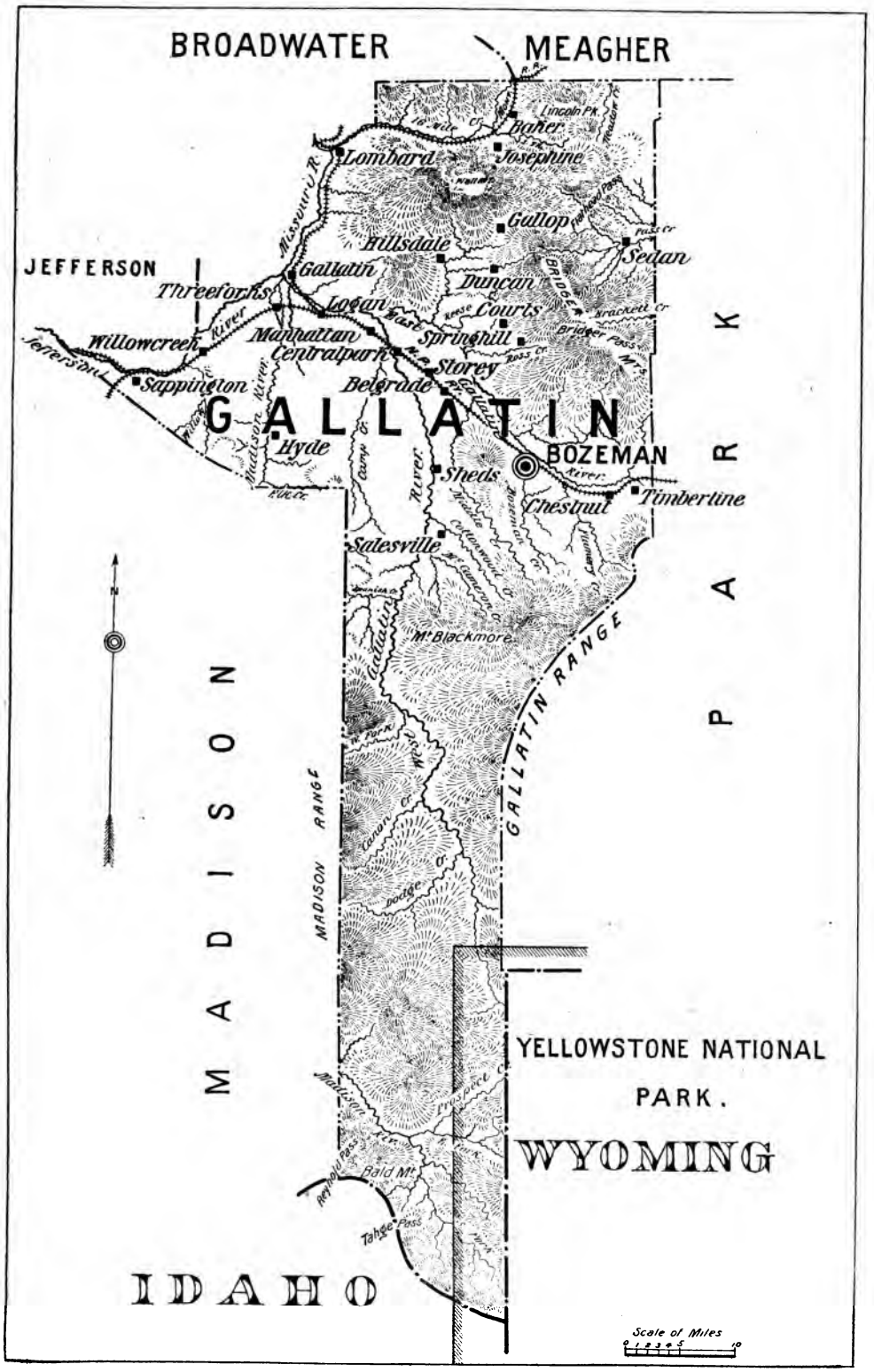

PRINCIPAL FEATURES.

Total area—1,665,000 acres; assessed acreage, 459,560. Resources—Farming, stock raising, lumber, coal. Railway facilities—Northern Pacific, Yellowstone River Railway. Bozeman—County seat, population, 3,000.

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PRINCIPAL FEATURES.

Total area—996,000 acres; assessed acreage, 103,482. Resources—Gold and silver mining, farming. Railway facilities—Northern Pacific and Philipsburg branch. Philipsburg—County seat, population 1,200.

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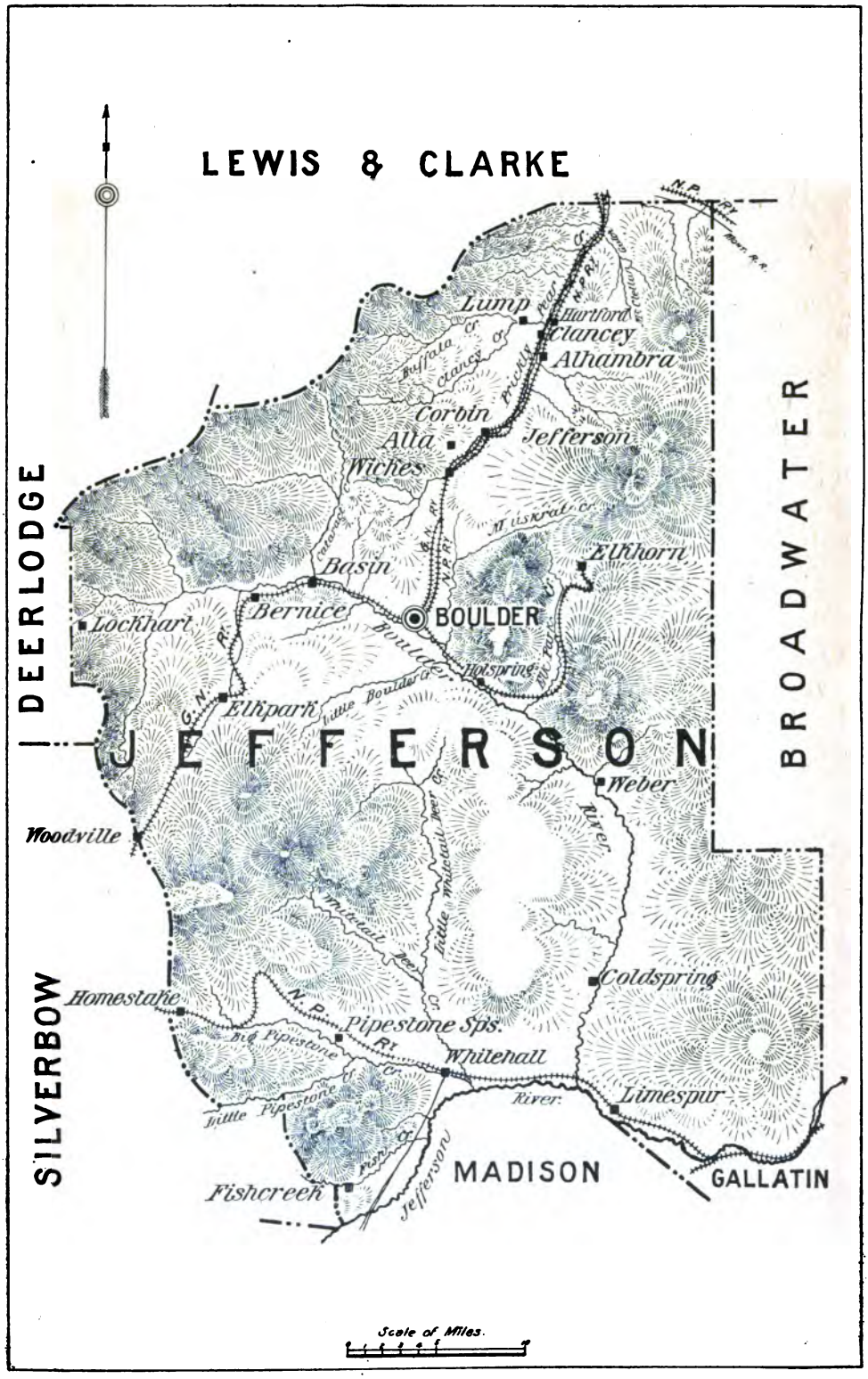

PRINCIPAL FEATURES.

Total area—1,051,000 acres; assessed acreage, 28,161. Resources—Gold and silver mining and refining. Railway facilities—Northern Pacific, Great Northern. Boulder —County seat, population 1,200.

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PRINCIPAL FEATURES.

Total area—1,802,500 acres; assessed acreage 349,398. Resources—Mining, smelting, manufacturing, agriculture. Railway facilities· Northern Pacific, Great Northern, Rimini Railway, Basin & Elkhorn Railway, Montana Railway, Marysville Railway Helena--County seat, state capital, population 14,000.

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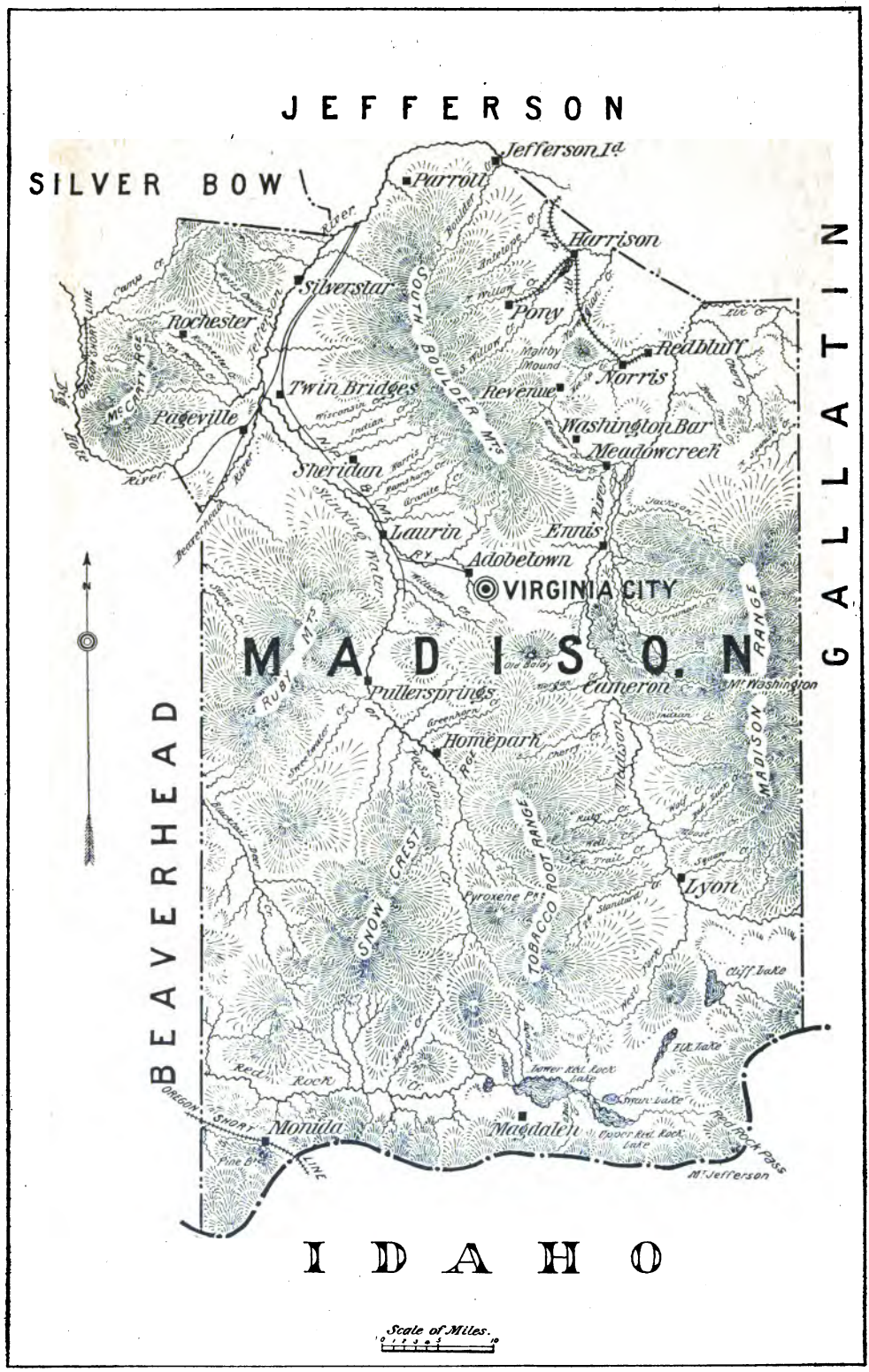

PRINCIPAL FEATURES.

Total area—2,887,000; assessed acreage, 341,332. Resources—Stock raising, farming and gold mining. Railway facilities—Northern Pacific and branches. Virginia City—County seat, population 900.

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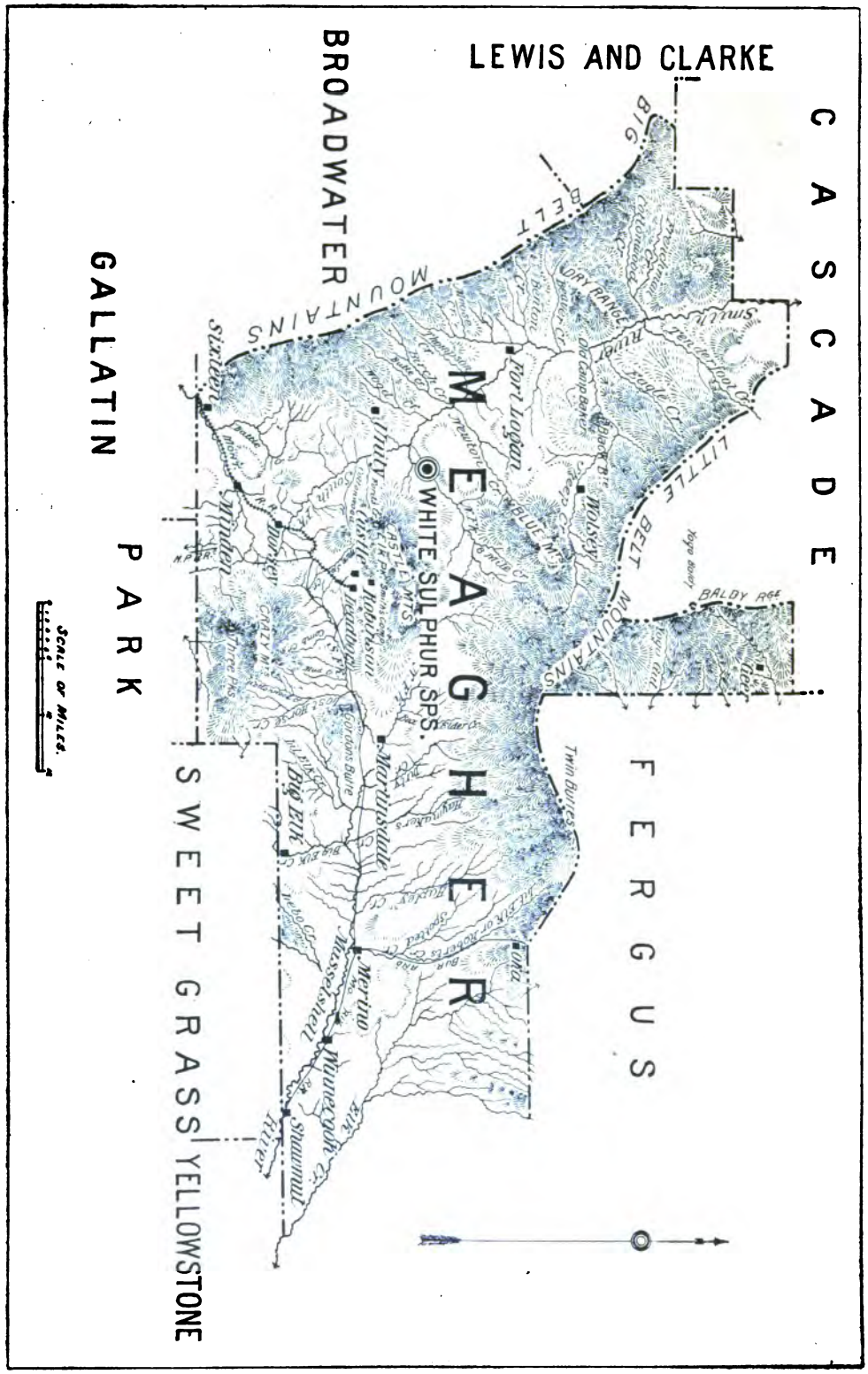

PRINCIPAL FEATURES.

Total acreage—2,650,000; assessed acreage, 608,715. Resources—Stock raising, wool growing, agriculture, mining. Railway facilities—Montana railway. White Sulphur Springs—County seat, population 1,000.

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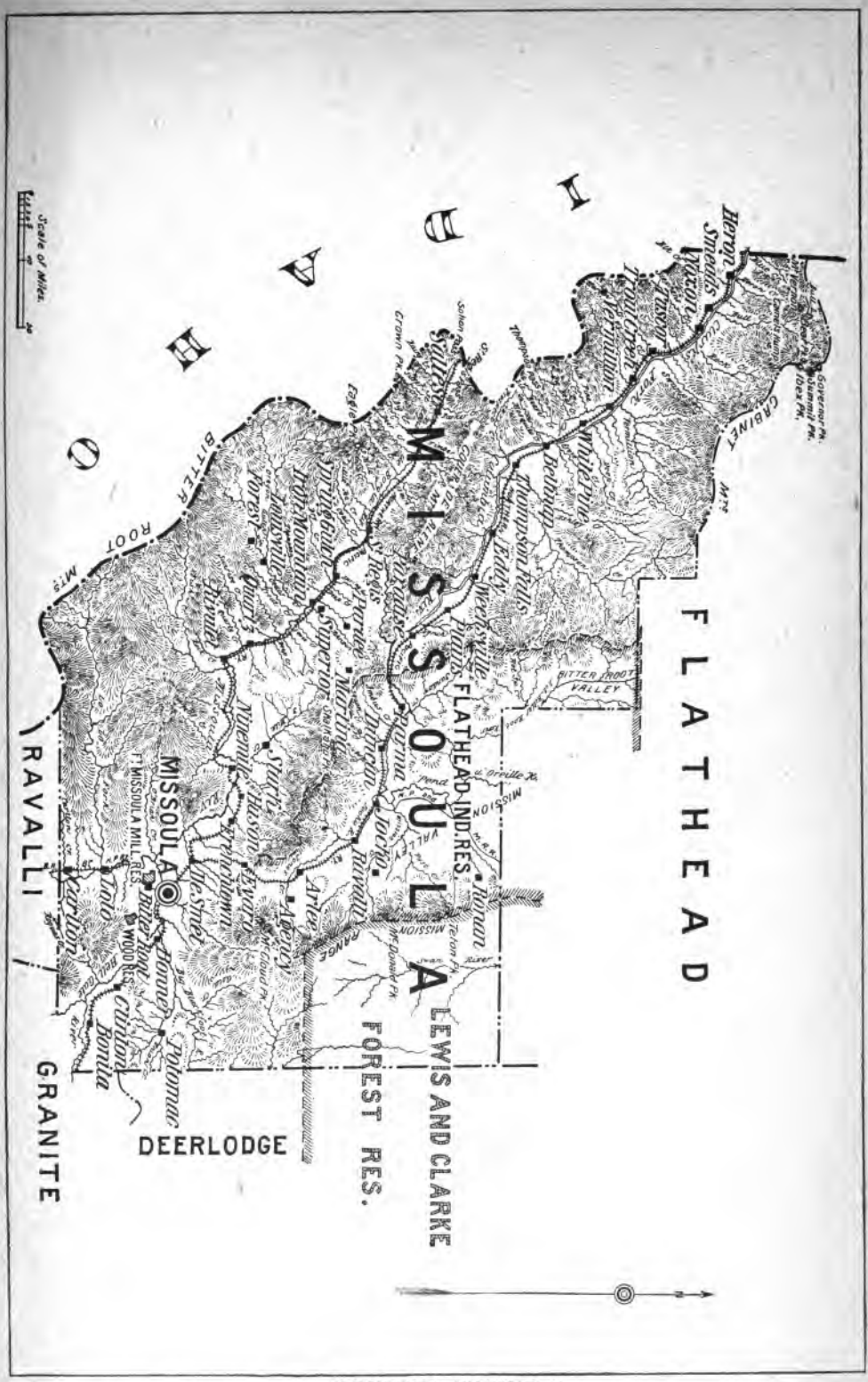

PRINCIPAL FEATURES.

Total area—5,158,000 acres; assessed acreage, 420,687. Resources—Agriculture, horticulture, stock raising, mining, lumber. Railway facilities—Northern Pacific and Bitter Root and Blackfoot branches. Missoula—County seat, population 6,500.

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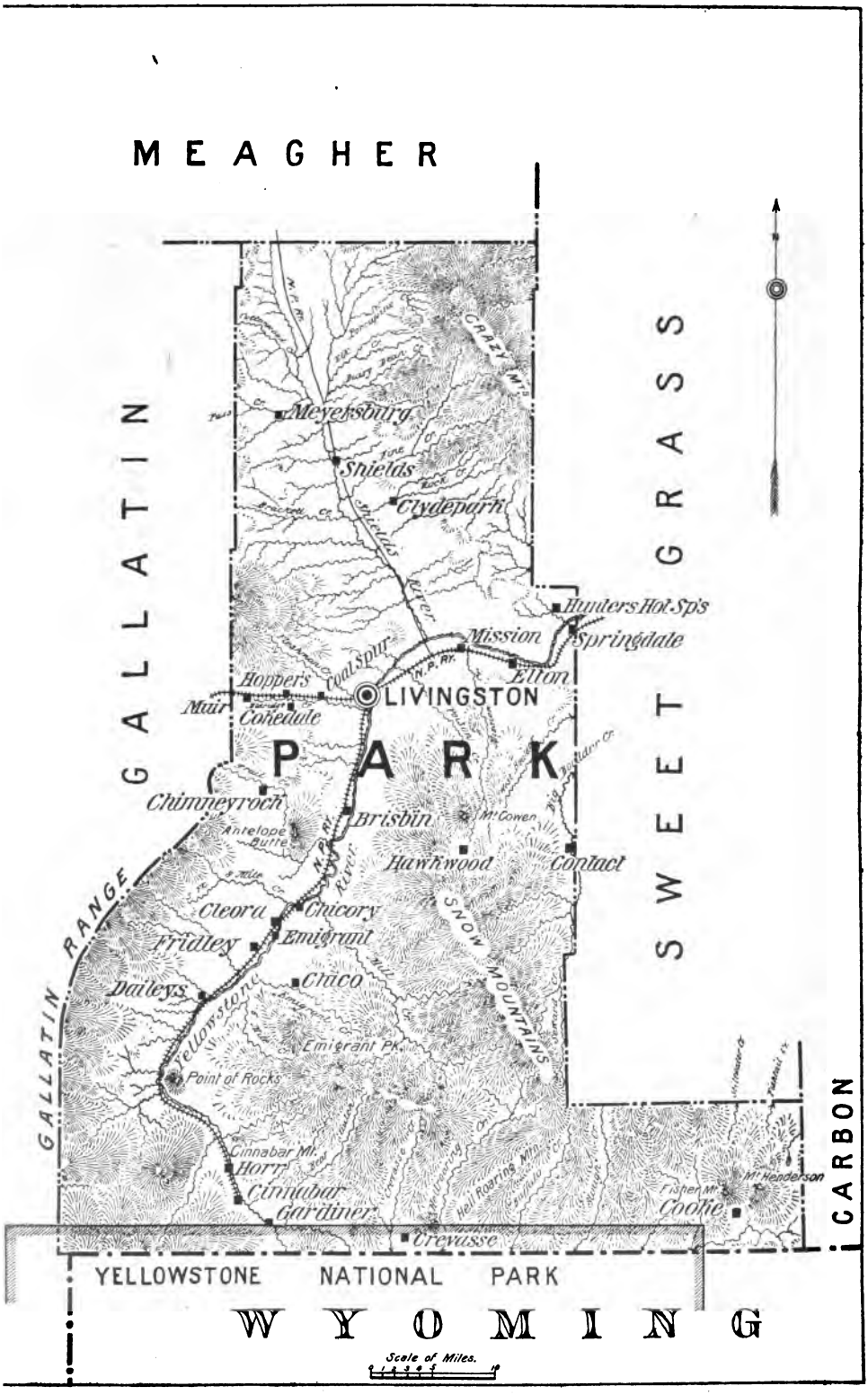

PRINCIPAL FEATURES.

Total area—1,798,000; assessed acreage, 354,394. Resources—Mining gold, coal; manufacture of coke and agriculture. Railway facilities—Northern Pacific and N. P. National Park branch. Livingston—County seat, population 3,000.

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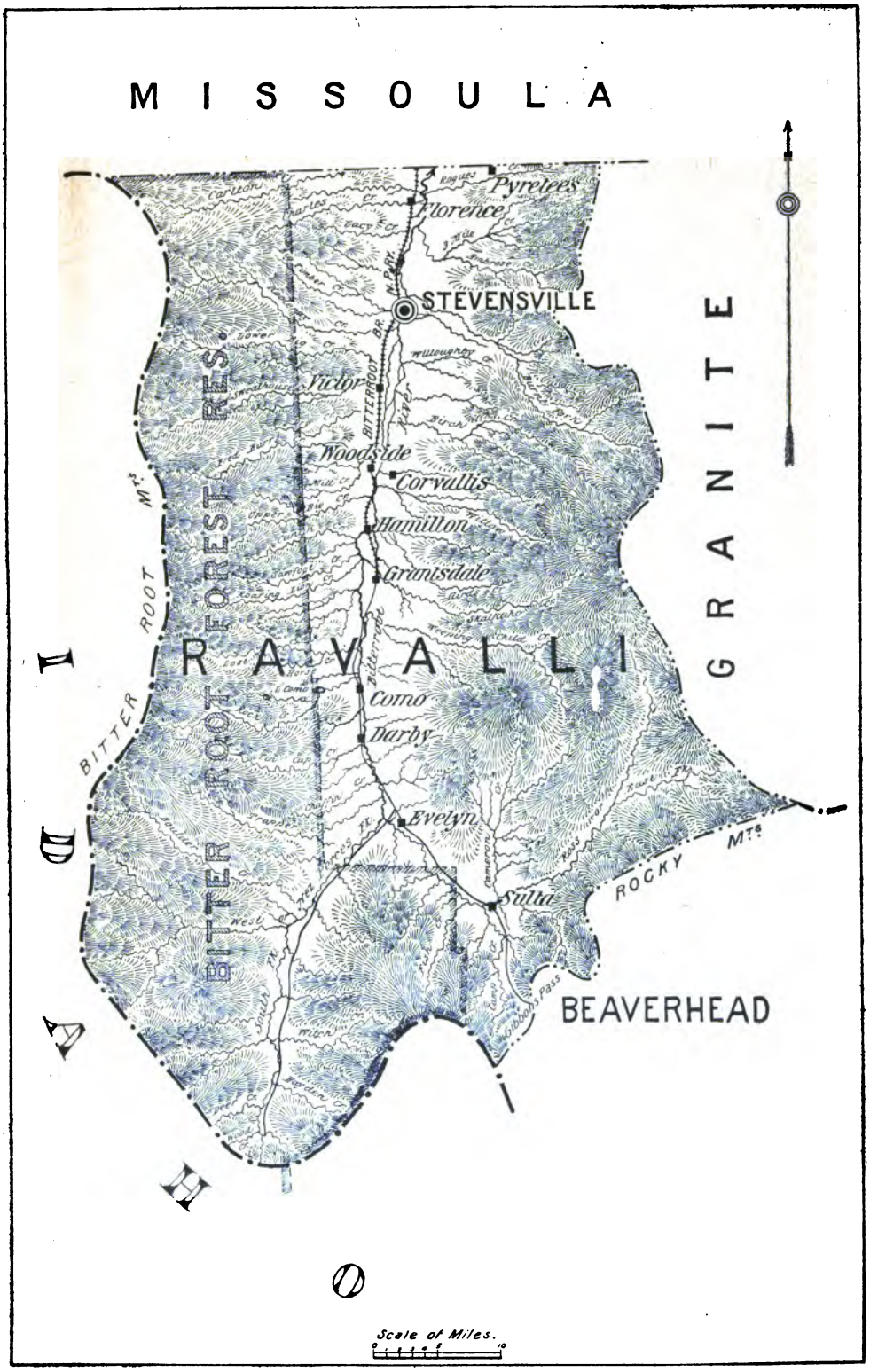

PRINCIPAL FEATURES.

Total area—1,850,000 acres; assessed acreage 166,066. Resources—Farming, stock raising, fruit growing, lumber. Railway facilities—Northern Pacific. Hamilton—County seat, population 1,800.

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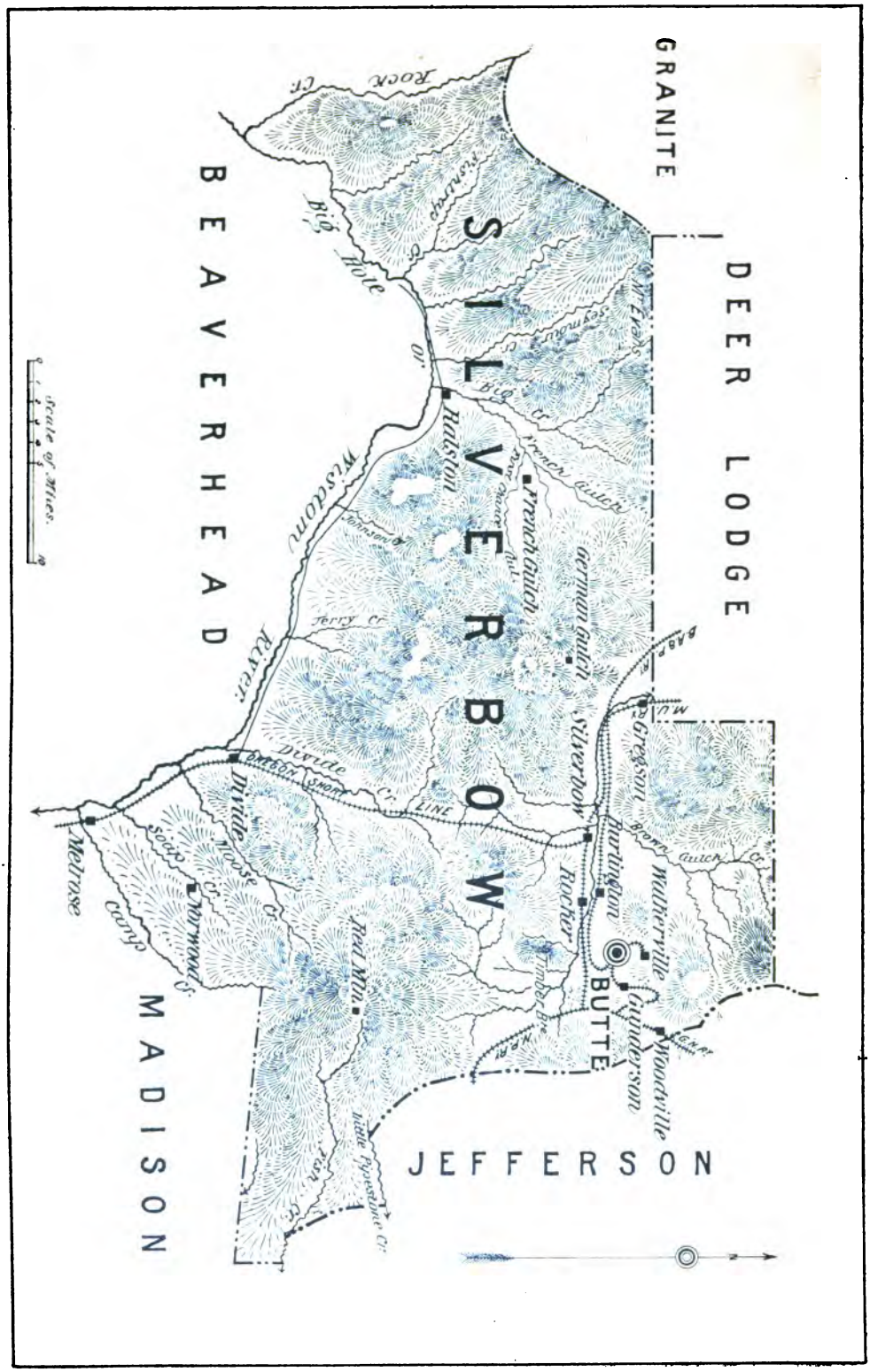

PRINCIPAL FEATURES.

Total area—510,000 acres; assessed acreage 62,475. Resources—Copper, gold, silver, mining, smelting and refining. Railway facilities—Northern Pacific, Great Northern Union Pacific, Butte, Anaconda & Pacific. Butte—County seat, est. population 65,000.

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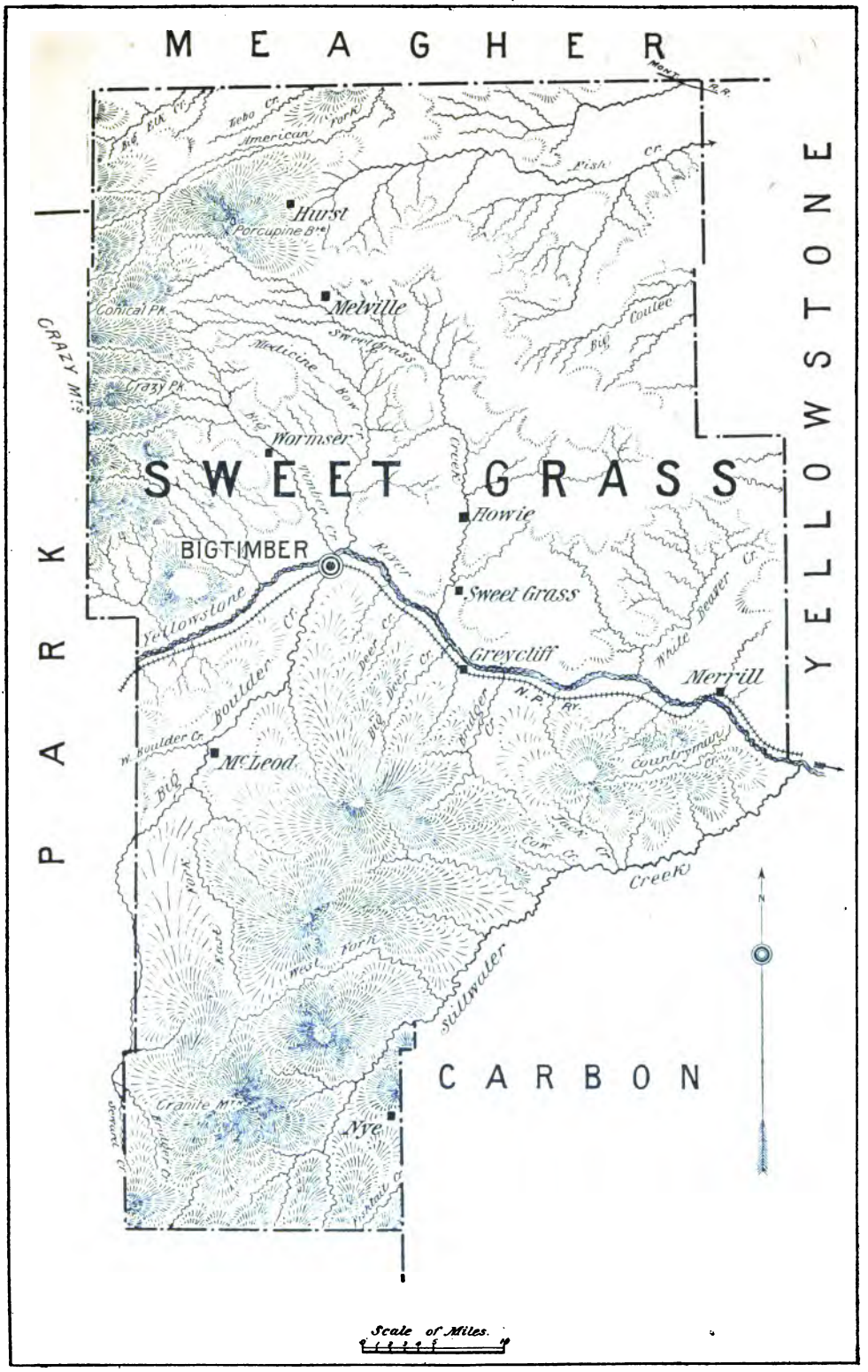

PRINCIPAL FEATURES.

Total area—1,841,000 acres; assessed acreage 455,591. Resources—Stock raising, wool growing, agriculture, coal, gold mining. Railway facilities—Northern Pacific. Big Timber—County seat, population 500.

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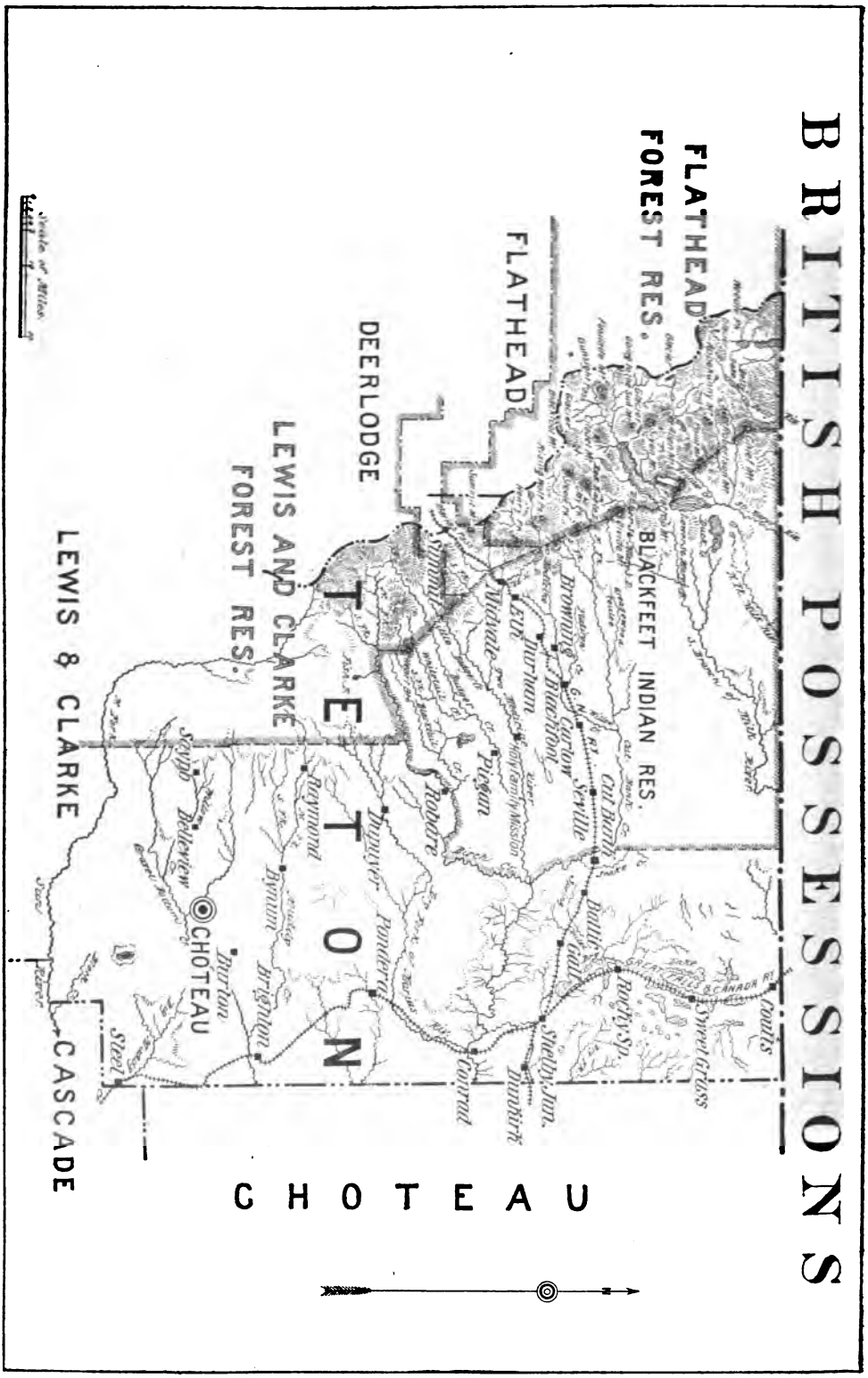

PRINCIPAL FEATURES.

Total area—4,703,000 acres; assessed acreage 146,100. Resources—Stock raising, wool growing, agriculture. Railway facilities—Great Northern and Great Falls and Canada. Choteau—County seat, population 300.

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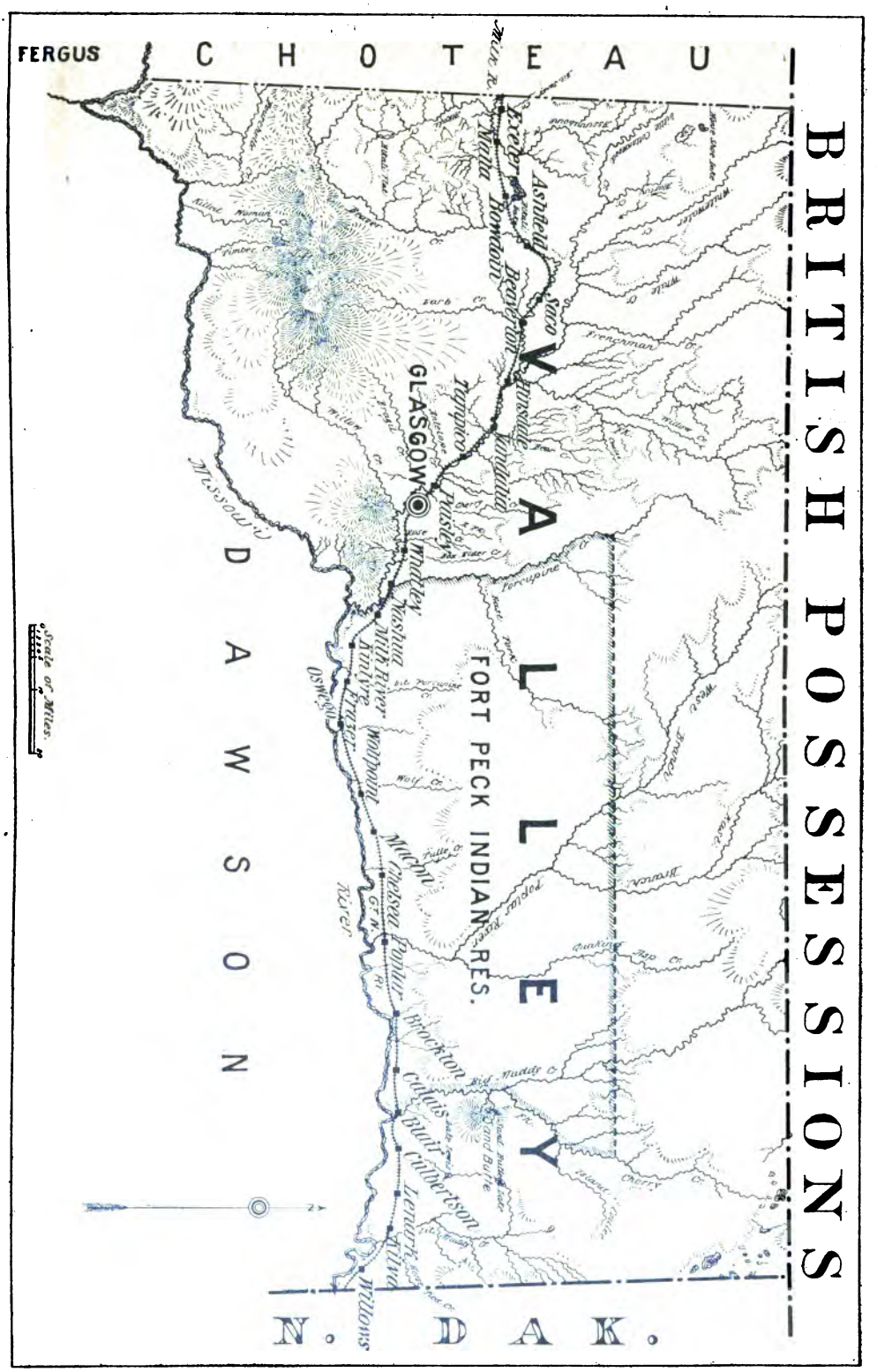

PRINCIPAL FEATURES.

Total area—8,575,000 acres; asessed acreage, 1,089. Resources—Stock raising, wool growing and agriculture. Railway facilities—Great Northern. Glasgow—County seat, population 700.

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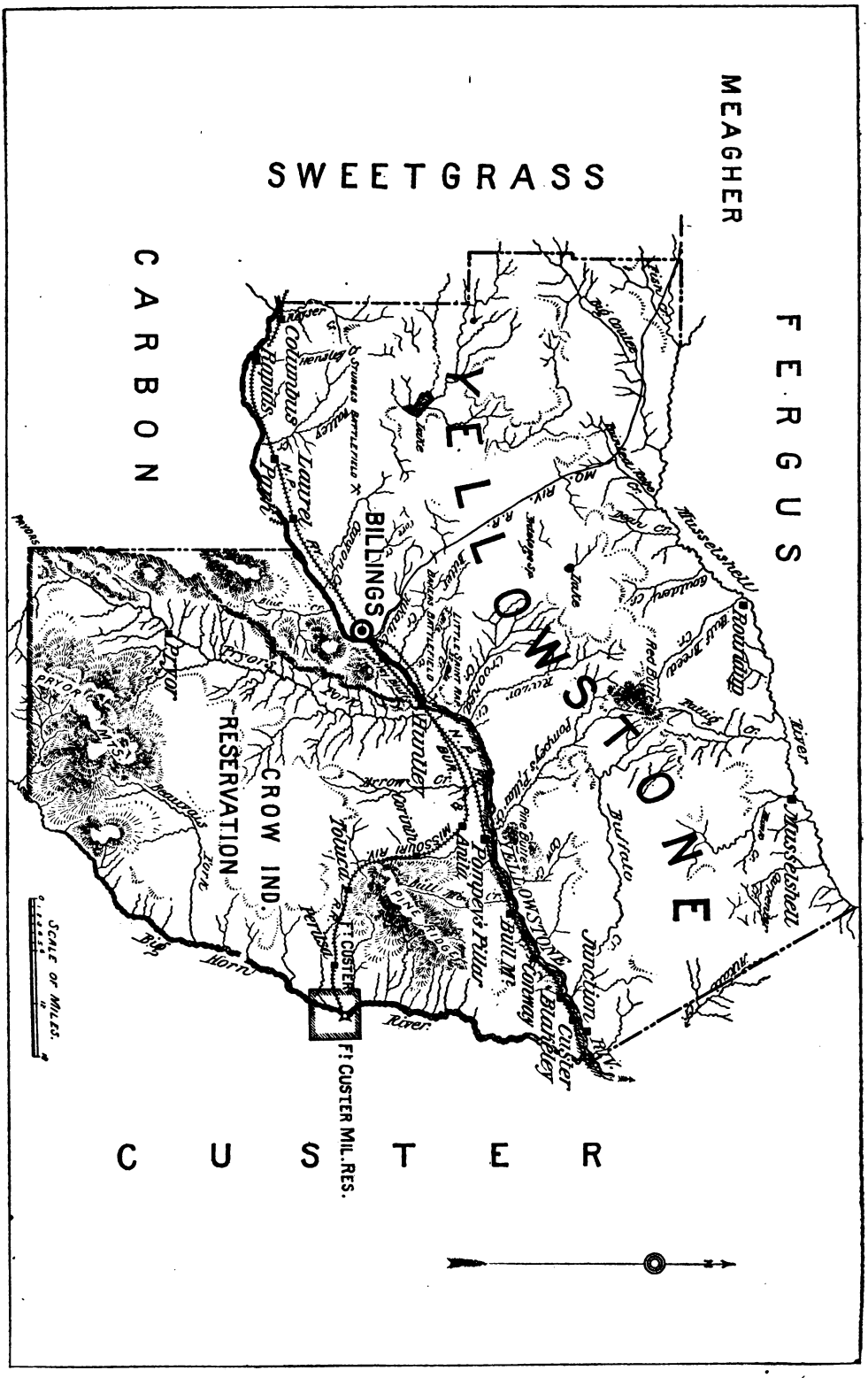

PRINCIPAL FEATURES.

Total area—2,370,000 acres; assesed acreage, 829,459. Resources—Agriculture, wool growing, stock. Railway facilities—Northern Pacific and Burlington & Missouri. Billings—County seat, population 2,000.

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